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The Change Program: Comparing an Interactive Versus Prescriptive Telephone-Based Behavioural Intervention on the Psychological and Physiological Profiles of University Students with Obesity

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A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy

THE CHANGE PROGRAM: COMPARING AN INTERACTIVE VERSUS PRESCRIPTIVE TELEPHONE-BASED BEHAVIOURAL INTERVENTION ON THE PSYCHOLOGICAL AND PHYSIOLOGICAL PROFILES OF UNIVERSITY STUDENTS WITH OBESITY

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Abstract

The purpose of the CHANGE (Coaching towards Healthy Actions Naturally through Goal-related Empowerment) Program was to compare the effectiveness of an interactive versus prescriptive 12-week telephone-based behavioural intervention on the psychological and physiological profiles of university students with obesity. Motivational Interviewing administered using Co-Active Life Coaching (MI-via-CALC) and a structured lifestyle treatment following the LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) Program for Weight Management were examined.

Article 1 provided a methodological account of the CHANGE Program which included a detailed rationale for its development and a comprehensive description of the methods used. Because goal setting has been established as an accessible and empowering tool to evoke health behaviour changes, Article 2 explored systematically the utility of this strategy in adults with overweight and obesity. Findings were used, in part, to inform the development of the CHANGE Program.

The purpose of Article 3 was to compare the impact of MI-via-CALC with the LEARN Program on the quality of life and self-esteem of participants during the intervention, and three- and six-months following its completion. Significant improvements to both dimensions were observed across the groups between baseline and the follow-up periods. Article 4 compared the effectiveness of the interventions from a self-management perspective on anthropometric, blood lipid profiles, and dietary risk factors associated with the development of type 2 diabetes. A qualitative exploration of participants' experiences was also undertaken. A significant time effect was observed for weight with the LEARN group decreasing more than the MI-via-CALC group during the

intervention while MI-via-CALC participants decreased their calories consumed more than LEARN participants during this same time. Qualitatively, the MI-via-CALC group focused on self-understanding, and -responsibility as primary outcomes of their experience; the LEARN group stressed their appreciation of practical knowledge gained.

This is the largest MI-via-CALC study conducted to date and the first to incorporate specific measures of physiological determinants, and a validated comparison group. MI-via-CALC compared favourably with LEARN as a treatment for obesity indicating that both are warranted in isolation or in combination with one another. The best fit and unique contributions of each approach should be considered when working with this population.

Keywords: Co-Active life coaching, motivational interviewing, obesity, lifestyle intervention, goal setting, student

Co-Authorship

The material presented in this dissertation is my original work. However, I would like to acknowledge the important contributions and collaborations of five co-authors. First, I would like to thank my advisors, Dr. Jennifer Irwin and Dr. Don Morrow, for their ongoing guidance, insights, and support with regard to all aspects of the four articles included in this dissertation. Second, I would like to thank Dr. Danielle Battram and Dr. Jamie Melling for their assistance with analyzing and interpreting the nutrition and bloodwork data for Article 4. Finally, I would like to acknowledge and thank Dr. Craig Hall for his ongoing analytical and methodological guidance, in particular, his assistance with Article 3.

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Preface

Purpose and Introduction

Throughout this dissertation, the effectiveness of Motivational Interviewing administered via Co-Active Life Coaching (MI-via-CALC) as a behavioural obesity intervention among university students was examined. The Coaching towards Healthy Actions Naturally for Goal-related Empowerment (CHANGE) Study was developed in response to a paucity of much needed, large-scale MI-via-CALC-obesity research that includes sufficient statistical power and the use of a comparison group. The purpose of CHANGE was to consolidate these dimensions and evaluate comparatively, the effectiveness of MI-via-CALC, an interactive and personalized treatment, with a well-validated, education-based lifestyle modification program over the course of a 12-week intervention delivered via telephone with a six-month follow-up period. The LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) Program for Weight Management was chosen to serve as the gold standard comparison condition. To bring this to fruition, four distinct yet complementary articles were written.

The first article provides a comprehensive account for the CHANGE Study including its design, treatment and population rationales, recruitment methods, outcome measure descriptions, and procedural details pertaining to the interventions themselves. This particular piece serves as the foundation from which the subsequent articles were developed. Approaching the treatment of obesity from a behavioural perspective inherently involves helping individuals to acquire a set of skills that they can apply to achieve a healthier weight and lifestyle. Through a goal directed process, individuals are helped not only in deciding what to change, they are assisted in identifying how to

change in a manner that works for them. This concept is inherent in both MI-via-CALC and LEARN, albeit in different ways. The second article expanded on the study rationale by exploring systematically the utility of goal setting as a strategy for health behaviour change among individuals struggling with their weight.

The remaining two articles represent two studies that were undertaken in a university student population (n = 45; body mass index $\geq$ 30kg/m^2) to examine the: (a) psychological impact of MI-via-CALC and LEARN on self-esteem and quality of life and whether changes to these dimensions were related to changes in body weight (Article 3); and (b) effectiveness of the two approaches on physiological risk factors associated with the development of obesity's epidemic partner, type 2 diabetes (i.e., blood lipid profiles, body weight, dietary intake), from a self-management perspective while exploring participant experiences in the program qualitatively (Article 4).

The integrated-article format was used to structure the content of this dissertation. Each section represents a separate manuscript focused, in whole or in part, on the utility of MI-via-CALC as a behavioural intervention for obesity. As a result, some of the information provided herein will overlap or be repeated. The introductory article contains an overview of the current obesity epidemic followed by a prologue to goal setting as a health behaviour change strategy, an overview pertaining to the MI-via-CALC method as a viable intervention for obesity, and a detailed account of the CHANGE Study methodology.

Article 1

The CHANGE Program: A Methodological Account of a Goal-based Study for University Students Comparing an Interactive versus Prescriptive 12-week Treatment for Obesity[1]

Obesity

Obesity is a rapidly escalating epidemic that has been described as the most prevalent nutritional problem worldwide (Lau et al., 2007). In 2008, the World Health Organization (WHO) estimated that there were more than 1.5 billion overweight adults globally, 500 million of whom were defined as obese (WHO, 2011a). The consequences of this "globesity" (WHO, 2011b) are gargantuan; obesity has been identified as a risk factor for a multitude of chronic and non-communicable diseases, not to mention the exorbitant socio-economic costs that are incurred as a result (Lau et al., 2007; Statistics Canada, 2006; WHO, 2011a). Mirroring this worldwide trend, in Canada, a consistent and significant increase in obesity has been observed in recent years (Statistics Canada, 2006; Shields, Carroll, & Ogden, 2011; Tremblay, Katzmarzyk, & Willms, 2002). In fact, data from the 2007-2009 Canadian Health Measures Survey indicate that 24.1% of the population, more than 5.5 million adults, are now obese (i.e., Body Mass Index [BMI] $\geq 30 kg/m^2$; Shields et al., 2011).

The health consequences and co-morbidities resulting from excess weight have been well documented. Obesity has been linked to a wide range of chronic illnesses and conditions including but not limited to: hypertension, hypercholesterolemia, insulin

[1] A version of this chapter has been submitted for publication. The copyright release forms for accepted manuscripts from this dissertation are included in Appendix A.

resistance, type 2 diabetes, gall bladder disease, obstructive sleep apnea, cardiovascular disease, coronary artery disease, some types of cancer, osteoarthritis, and impaired fertility (Luo et al., 2007; Wilson, D'Agostino, Sullivan, Parise, & Kannel, 2002). In addition, individuals with excess adiposity have an increased risk of premature mortality as compared to those of normal weight (Katzmarzyk, Craig, & Bouchard, 2001). Among Canadians, nearly one in ten premature deaths can be attributed to overweight and obesity issues (Katzmarzyk & Ardern, 2004).

The cause of obesity is multi-faceted and complex. Body weight can be influenced by a combination of determinants including ones that are genetic, metabolic, behavioural, environmental, cultural, and socio-economic (Sharma, 2007). However, the most elementary explanation involves a long-term positive energy balance. Researchers have attributed the etiology of the current epidemic primarily to an increased consumption of energy-dense foods low in essential nutrients and high in sugar and fat content, combined with reduced levels of physical activity (Lau et al., 2007; Hill & Peters, 1998; WHO, 2011a). Thus, the complexity of this issue warrants examining the means by which individuals might ameliorate their caloric consumption while increasing expenditure. Exploring behavioural strategies aimed at attenuating these rates has been recommended (Strychar, 2004).

Post-secondary educational attainment has grown steadily since 1990, with the percentage of individuals holding a bachelor's degree nearly doubling between 1990 and 2006 (Canadian Council on Learning, 2006). Given the fact that nearly one quarter of Canadians with some post-secondary education is obese (Statistics Canada, 2006), examining obesity and health within this population is an important consideration. As

individuals positioned to become future policy makers, senior managers, and professionals, the beliefs and attitudes held by university students regarding health and health-related lifestyles are expected to have considerable influence on the general well-being of the population (Stewart-Brown et al., 2000). Moreover, many of the physical activity behaviours and dietary habits developed between the ages of 18 and 24 are indicative of prospective health status across the life span (Clement, Schmidt, Bernaix, Covington, & Carr, 2004). It is therefore imperative that intervention strategies which seek to slow and reverse this alarming epidemic be examined with a view towards enabling these students to become healthy adults (Katzmarzyk, 2007; Lau et al., 2007).

Goal Setting and the Behavioural Treatment of Obesity

The Ottawa Charter (WHO, 1986) definition of health promotion states that health is a positive concept emphasizing social and personal resources, in addition to physical capabilities. The crux of this concept is based on the notion that enabling individuals to improve and increase control over their own health is paramount (WHO, 1986). Congruent with these tenets, approaching the treatment of obesity from a behavioural perspective involves helping individuals to develop a set of skills that they can apply to achieve a healthier weight (Foster, Makris, & Bailer, 2005). Through a goal directed process, individuals are helped not only in deciding what to change; they are helped to identify how to change in a manner that works for them (Foster et al., 2005; Whitworth, Kimsey-House, Kimsey-House, & Sandahl, 2007). According to Locke and Latham (2006), goals refer to valued future outcomes, while goal setting implies a state of discontent with a current situation and desire to attain an alternative outcome. Goal setting has been established as an accessible and empowering tool used effectively in

different settings to evoke health behaviour changes in various populations (Bodenheimer & Handley, 2009; Cullen, Baronowski, & Smith, 2001; Pearson, 2012; Shilts, Horowitz, & Townsend, 2004; Strecher et al., 1995). A recent systematic literature review examined 18 studies that used goal setting as a behaviour change strategy specific to diet and physical activity among adults with overweight and obesity in community-based settings (Pearson, 2012). An analytical exploration of the specific components incorporated within these interventions was undertaken (e.g., how the goal was set and by whom; whether subsidiary tools were included such as self-monitoring logs) in order to identify an optimal combination of goal setting features that could be used to elicit salient outcomes specific to these behaviours (Pearson, 2012). As a function of applying the START Evaluation Criteria, which were developed for the purposes of this review and considered the specificity, timing, acquisition, rewards and feedback, and tools used when setting a goal, it was determined that goals set "in close proximity with a desired distal outcome, involving the participant in acquisition, and incorporating regular feedback" (Pearson, 2012, p. 41) were common features in these study contexts. Moreover, educating participants and integrating a self-monitoring component were also identified as important inclusions. Positive results experienced among participants varied and included decreases in weight and BMI levels, lowered food and unhealthy beverage consumption, increased energy expenditure, and greater health behaviour intentions (Pearson, 2012). In light of these findings, when seeking to address obesity from a behavioural perspective, it stands to reason that the inclusion of a goal setting component could prove to impact prospective measures positively and should therefore be considered as part of the intervention methodology.

Motivational Interviewing Applied using Co-Active Life Coaching Tools

One such individualized, goal setting-based approach that is being used increasingly to effectuate improvements in health and health behaviours is Motivational Interviewing applied using Co-Active life coaching tools (referred to herein as MI-via-CALC; Newnham-Kanas, Morrow, & Irwin, 2010; Rollnick & Miller, 1995; Whitworth et al., 2007). Health-related coaching is a fast growing area of research in the health promotion arena and has been utilized effectively in ameliorating many conditions and diseases, including but not limited to: depression, attention deficit hyperactivity disorder, asthma, diabetes, cancer, poor cardiovascular health, and fitness (Newnham-Kanas, Gorczynski, Irwin, & Morrow, 2009). Encompassing the tenets of Motivational Interviewing, a client-centred counselling style that helps people to explore and resolve their ambivalence for change (Miller & Rollnick, 2002; Rollnick & Miller, 1995), the Co-Active model is a specific style of life coaching that ultimately seeks to deepen the client's learning and/or forward the client towards some action of his or her choosing (Newnham-Kanas et al., 2010; Whitworth et al., 2007).

There is compelling evidence that interventions targeting health behaviour change should be based on validated theories (Brug, Oenema, & Ferreira, 2005; Fishbein & Yzer, 2003; Rothman, 2004). The Co-Active model has been grounded in several well-established behavioural theories including: Social Cognitive Theory; the Theory of Reasoned Action; the Theory of Planned Behaviour; and Self-Determination Theory (Irwin & Morrow, 2005; Pearson, 2011). Elements of these theories (e.g., expectations, self-efficacy, reinforcement, autonomy) serve to explicate the utility of MI-via-CALC as an evidence-based practice and provide a framework for promoting behaviour change

through the application of MI-via-CALC-specific tools and strategies. Researchers examining optimal treatment conditions for altering health behaviours have shown that promoting autonomy and empowerment while fostering intrinsic motivation (i.e., that which comes from within the individual) is essential when seeking to elicit and *sustain* behaviour change successfully in at-risk populations (Ryan, Patrick, Deci, & Williams, 2008). The Co-Active model aims to establish these conditions through its inherent principles and client-centered methodology (Pearson, 2011; Whitworth et al., 2007).

Through MI-via-CALC, a proactive alliance between a qualified coach and client is established whereby specific goals are set by the client in order to reach enhanced levels of performance, learning, growth, or fulfillment (International Coach Federation [ICF], 2011; Whitworth et al., 2007). This dynamic relationship is created to meet the client's needs, and is established through continuous dialogue. According to this model, clients are considered the experts in their lives and recognized as having the answers to their own questions and the coach helps clients to access these answers (Irwin & Morrow, 2005; Whitworth et al., 2007); the client is in control of the coach-client relationship and responsible for establishing the discussion topic or agenda of each session (Whitworth et al., 2007). The coaching process begins with a personal interview which is conducted in order to: determine how the coach and client will work with one another; identify any challenges or opportunities the client is facing presently; and establish, if possible, specific goals or desired outcomes. Within the MI-via-CALC model, the role of the coach is to: engage in a supportive manner to elicit answers from within the client; facilitate exploration of the goal(s) which s/he wants to achieve; and work with the client to brainstorm and identify solutions for goal attainment. Responsibilities of the coach

involve listening, offering reflective summaries, asking meaningful questions, and empowering the client as opposed to advising or instructing (ICF, 2011; Whitworth et al., 2007). Co-Active coaches are trained to use and integrate numerous skills (e.g., intuition, curiosity, articulating, acknowledgement); the types of techniques and tools applied are personalized and dependent on the particular needs of the client and the context of each coaching session (Whitworth et al., 2007). Coaches are also taught to self-manage when interacting with clients. That is, the coach refrains from sharing personal thoughts or feelings on a subject in order to ensure that s/he remains engaged and able to focus entirely on the client's perspective and agenda. Coaching sessions are usually conducted over the telephone for a pre-determined length of time (ICF, 2011) and in service of achieving personal goals, the client is often asked to perform specific actions or complete assignments between coaching sessions (for a complete description of the MI-via-CALC method, please refer to Whitworth et al. 2007).

Considerable obesity documentation in Canada exists; however, research aimed at critically evaluating innovative and population-specific behaviour change methods from a health promotion perspective are lacking. Moreover, given that health-related coaching is, at present, one of the fastest growing fields of research (Newnham-Kanas et al., 2009), documented accounts of rigorous empirical studies are needed. Previous small-scale MI-via-CALC-obesity studies (i.e., sample size ≤ 20) in adult populations have suggested that physical and psychological indices are modifiable (e.g., reduced waist circumference, body weight, and BMI; enhanced self-esteem; improved health status) and do respond well to a MI-via-CALC-based intervention (Newnham-Kanas, Irwin, & Morrow, 2008; Newnham-Kanas, Irwin, Morrow, & Battram, 2011; van Zandvoort, Irwin, & Morrow,

2008, 2009). What has become evident and recommended from these previous studies is that there is a paucity of much needed large-scale MI-via-CALC-obesity research that includes: a priori identification of outcome measures including psycho-social and physiological dimensions; sufficient statistical power; and use of a comparison group. Informed by this body of research, a large-scale MI-via-CALC-obesity study for university students was developed (i.e., the CHANGE Study). In service of assisting researchers and health professionals, the purpose of the present paper is to provide a detailed methodological account of this intervention with a view towards informing the development of prospective programs aimed at attenuating obesity rates and health sequelae in this at-risk population.

Methods

What is the CHANGE Study?

The CHANGE (Coaching towards Healthy Actions Naturally through Goal-related Empowerment) study is a 12-week, telephone-based behavioural intervention incorporating goal setting that is aimed at improving physiological and psychological markers among university students with obesity. The purpose of CHANGE was to consolidate the aforementioned components (i.e., a priori outcome measures, large sample size, and a comparison group) and evaluate comparatively, the effectiveness of an interactive, personalized MI-via-CALC treatment, with a validated, gold-standard, education-based lifestyle modification program incorporating the LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) Program for Weight Management (Brownell, 2004; described in detail below). The LEARN Program was chosen based on: (a) its longevity (i.e., the first edition was published in 1976 and nine subsequent editions

have been written since that time); (b) its efficaciousness as evidenced by publications in a number of esteemed journals (e.g., The New England Journal of Medicine; Journal of the American Medical Association); and (c) its widespread use by clinicians, weight control clinics, and the general public alike as can be garnered through simple Internet searches. Participants were assigned randomly to the MI-via-CALC or LEARN condition upon enrollment and received one treatment per week with varied content depending on their allocation. In light of the positive outcomes observed in previous small-scale MI-via-CALC-obesity studies encouraging health behaviour change through talking, it was hypothesized that there would be a desirable change in level of obesity accompanied by positive changes in physical activity, nutritional intake, health status, and physiological/psychological markers both during and following the intervention in the MI-via-CALC group, and that these changes would be comparable to those observed in the previously validated LEARN condition across the time points examined.

The Co-Active Life Coaching Treatment

The Coaches. Volunteer certified Co-Active Professional Life Coaches (CPCCs) were recruited by the Project Coordinator via e-mail between April 2010 and March 2011 through the Co-Active Network (2011; see Appendix B): an international website affiliated with the Coaches Training Institute dedicated to connecting Co-Active coaches for the purposes of information exchange and professional development. CPCC training is recognized by the International Coach Federation as meeting standards for international certification. Eligibility criteria for study involvement required that each individual be certified as a CPCC through the Coaches Training Institute, and able to commit to coaching at least two participants pro bono over the duration of the study. In

total, 49 inquiries were made by interested CPCCs from countries including Canada, The United States, Sweden, Germany, and England. Because the intervention was intended to occur by telephone, it was determined that coaches who were eligible and wishing to be involved in the study reside in North America in order to limit barriers such as extensive time differences and potential miscommunications due to accents and differential semantic interpretations. After initial contact was made by e-mail, a phone consultation was arranged between the interested CPCC and the Project Coordinator to discuss the coaches' credentials and involvement interests, as well as detail the study protocol and volunteer commitment requirements. All coaches involved were advised that they would not be involved in any other aspect of the study beyond the twelve coaching sessions per client. Full recognition on all subsequent published materials was offered in exchange for their coaching services. As a result, sixteen coaches were enrolled in the CHANGE study to deliver the MI-via-CALC intervention (from Canada, $n = 7$; from the United States, $n = 9$). Three withdrew after commencing involvement due to scheduling conflicts and personal issues; participants assigned to these particular CPCCs were reassigned to continue their treatment with another coach.

The MI-via-CALC Intervention. Participants assigned to the MI-via-CALC intervention group were to receive 12, 30-45 minute, life coaching sessions with a randomly assigned CPCC. Coaches and participants were matched based on the enrollment timeframe and the availability of both parties (e.g., a student beginning the study in January would be assigned to a coach who was able to take on a participant at that time based on his/her coaching practice, schedule, additional participant load, etc.). All sessions were completed over the telephone, as is typical with this style of coaching.

The participant was entirely responsible for calling the coach weekly at a pre-arranged time, with a specific topic he or she wished to discuss. For participants whose coaches lived outside of the local calling area, a phone card was provided and s/he was instructed to use this for study-related purposes only. During the sessions, the participant and CPCC explored what changes the subject wanted to make in his/her life, and how to make the desired changes a reality. All coaches involved in the study were advised to conduct the sessions in accordance with their CPCC training (i.e., topics for discussion are determined by the participant) whereby a variety of techniques are employed including: designing an alliance with the client; asking powerful questions; being genuinely curious about that client's experience; championing and acknowledging the client and his or her actions; challenging the client to attain his/her desired goals, and holding the client accountable to those actions. Although each participant was prescribed the same number of MI-via-CALC sessions, what was discussed and the skills used within each session varied depending upon each individual's needs. The content of the calls remained private between the coach and participant exclusively.

The LEARN Program for Weight Management Treatment

The LEARN Program for Weight Management (Brownell, 2004). The LEARN Program for Weight Management (10th Edition) consists of 12, step-by-step lessons for modifying behaviours and feelings in relation to five key principles: lifestyle, exercise, attitudes, relationships, and nutrition. Through the tools and strategies provided, the objective of the program is to assist people with developing the confidence and skills necessary to lose weight and maintain this loss over time. The program itself begins with an overview of foundational knowledge pertaining to health, diet, and physical activity.

Over the course of the lessons, the content becomes more advanced and includes detailed information on these constructs, in addition to problem solving strategies and cognitive restructuring techniques. Cumulatively, this information serves to complement the lifestyle modification exercises that are included throughout the program material. As part of their involvement, participants are encouraged to individualize the program recommendations to their unique circumstances through self-monitoring (e.g., keeping daily records of food and caloric intake as well as physical activity), form completion, and various assignments, the purpose of which is to enable greater self-awareness on both personal and habitual levels. Because the intervention was delivered over the telephone and each lesson was read verbatim to participants, the material was modified to fall within the pre-determined time frame (i.e., 30-45 minutes), and also included personifiers (i.e., the participants name) during delivery. Segue phrases were also added to enhance the flow of each section during delivery (e.g., "Now we're going to talk about…"). Dietary recommendations in the LEARN manual are based on the American Food Guide Pyramid and were thus tailored to reflect Canada's Food Guide to Healthy Eating (Health Canada, 2007).

The LEARN Specialists. Undergraduate upper year university students (i.e., third year students or beyond) enrolled in a science or health science-based program were recruited via e-mail and web-based postings by the Project Coordinator and Principal Investigator. One volunteer and three research assistants were hired to administer the LEARN Program over the telephone to participants. All Specialists were provided with the program material upon confirming involvement and were encouraged to practice reading each lesson several times in advance to enable the smooth delivery of

information when calling their assigned participants. In order to maintain treatment consistency across the individuals assigned to this particular condition, Specialists were instructed to answer questions pertaining to the material to the best of their knowledge using the information provided through the LEARN lessons. They were also advised to minimize discussions irrelevant to the focus of the session wherever possible. Participants were informed upon enrolment that the Specialists were hired for the study specifically, and information pertaining to their roles as university students was not disclosed.

The LEARN Intervention. LEARN group participants were to receive 12 education-based lessons pertaining to topics such as setting goals; barriers and facilitators to living healthy; the relationship between calories and weight; the role of social support; becoming more active; and self-monitoring. All sessions were completed over the telephone which, to our knowledge, is a new form of delivery for this particular program. That is, the LEARN Program typically has been delivered in person or independently using a self-help format (e.g., Wadden et al., 2005; Womble et al., 2004). LEARN Specialists were required to call their assigned participants weekly from the university health promotion laboratory at a pre-determined, mutually convenient time. During each session, step-by step, scripted educational lessons were provided to participants. Each session consisted primarily of LEARN program material being read to the participant by the Specialist; a brief "check-in" also occurred at the beginning and end of each session to determine if the participant had any questions pertaining to the lesson. As part of the LEARN protocol, participants were trained in record keeping and monitoring skills and asked to keep detailed logs of food intake and physical activity. In order to facilitate

temporal consistency for participants and provide an entitled break for the university student Specialists delivering the intervention, a two week hiatus from treatment occurred during the holiday exam period in December 2010; a one week break also took place in February 2011 to coincide with the university mandated "reading week."

Participants and Recruitment

This study targeted male and female undergraduate and graduate university students with obesity (i.e., defined as a BMI $\geq$ 30kg/m^2), aged 18-24. Participants were recruited via poster advertisements circulated throughout the university and via campus-wide e-mail "blasts" distributed to the entire student body (see Appendix C). The latter proved to be the most successful means of recruitment as more than 600 interested individuals made contact with the research team via e-mail or telephone between September 2010 and May 2011to inquire about the program. Once contact was made, the researcher explained the study and asked several questions to determine eligibility (see Appendix D). Inclusion criteria for acceptance required that potential participants: have a BMI of 30 kg/m^2 or greater, reported that their weight had not fluctuated by more than 5 pounds in the previous six months, did not have type I diabetes or a condition contraindicated for exercise, and could speak English fluently.

As part of the MI-via-CALC method to achieve participant buy-in as well as facilitate adherence to the program (Whitworth et al., 2007), participants were asked to pay $10.00 for each session that they were to receive regardless of group allocation. Although it was pre-determined that these funds would be returned to participants upon completion of the study, this was not relayed. If a student was unable to pay the $120.00, an arrangement was made based on their personal financial circumstances in order to

facilitate accessibility (e.g., charging half the price). Common reasons for declining involvement or ineligibility among those who made inquiries included a BMI $\leq$ 30kg/m^2; unable or unwilling to pay for treatment; older than 24 years of age; not a student enrolled at the university; or the presence of a medical condition or medication known to influence weight outcomes. Once inclusion criteria were met and a participant stated that s/he wanted to move forward, a baseline assessment meeting was arranged with the researcher at a mutually convenient time. A total of 78 individuals meeting these criteria were enrolled in the program between September 2010 and May 2011 (for a detailed depiction of participant flow and attrition, please see Figure 1, Article 3). Ethical approval for the study was obtained through the Health Sciences Research Ethics Board at the University where the study took place (see Appendix E) and all participants provided signed written consent prior to commencing involvement (see Appendix F).

Design

A parallel group randomized trial design with between and within subject variables was employed to enable comparisons between baseline data and subsequent assessment time-points (i.e., mid-intervention at 6-weeks; post-intervention at 12-weeks; 3-months post-intervention; 6-months post intervention) with regard to changes in the pre-determined physiological and psychological measures. A sample size calculation was conducted using the Horatio Computer Software Program, Version 3.0 (Lee, 2004). The inclusion of eighty participants was deemed sufficient in order to detect a medium effect (r^2 =.12) of a two-level between-groups independent variable 90.4 percent of the time using a .05 alpha level.

Measures

In order to obtain personal information, participants were asked to complete a demographic information form (see Appendix G) at the initial meeting with the researcher (e.g., name, address, telephone number, e-mail, gender, age, ethnicity, education and program, employment status, etc.). Because an increase in physical activity level was an anticipated study outcome, each individual was also required to complete the Physical Activity Readiness Questionnaire (PAR-Q; Canadian Society for Exercise Physiology, 2002) to ensure that (s)he had no health conditions precluding exercise (see Appendix H). Although the intended population was not considered a clinical or patient group necessarily, those who did not pass the PAR-Q (Canadian Society for Exercise Physiology, 2002) were referred to their general practitioner for a medical assessment to confirm their eligibility to participate, and a physician's note was required to substantiate any contraindication. Individuals who passed the PAR-Q and wished to move forward were then allocated to one of the two treatment groups based on a randomization code generated by SPSS.

The Short Form 36-item Functional Health Status Scale (SF-36; Ware, 2008). The SF-36 Health Survey is a validated, multi-purpose generic measure of functional physical health, mental health, and well-being (see Appendix I). Applicable to both general and specific populations, it has been utilized to compare the burden of disease and to decipher the varying health benefits produced by a range of treatment modalities (Ware, 2008). The 36-items on the questionnaire comprise eight scales and two summary measures; questions are answered on a 5-point Likert-type scale. Previous research supports the reliability of these structures (Cronbach's α's $\geq$ .70; Ware, 2008).

The International Physical Activity Questionnaire (IPAQ; Craig et al., 2003). Participants completed the 7-item validated self-report measure which is used to assess the amount of time spent doing multiple types of physical activity over a 7-day period (Craig et al., 2003; see Appendix J). Individuals provided information pertaining to activities performed in relation to work, as part of house and yard work, to get from place to place, and in their spare time for recreation, exercise, or sport. Activities include: vigorous (activities that take hard physical effort and make you breathe much harder than normal), and moderate (activities that take moderate physical effort and make you breathe somewhat harder than normal) physical activity, as well as walking, and sitting. Previous research has deemed the IPAQ to be a reliable measure (Craig et al., 2003; Rosenberg, Bull, Marshall, Sallis, & Bauman, 2008).

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES is a validated, general measure of self-esteem that assesses various feelings about oneself pertaining to facets such as self-respect and personal worth (see Appendix K). Participants responded to statements such as "I certainly feel useless at times" on the 10-item questionnaire using a 4-point scale anchored at the extremes by (1) Strongly agree and (4) Strongly disagree. Individual items are summed and averaged to provide a total score. Previous research has demonstrated the reliability of the RSES (Cronbach's $\alpha \geq .77$; Blascovich & Tomaka, 1993; Rosenberg, 1989).

Self-efficacy for Overcoming Barriers (McAuley & Mihalko, 1998). Self-efficacy for performing behaviours specific to physical activity and nutrition was captured using three questionnaires based on the work of McAuley and Mihalko (1998; see Appendix L). Self-efficacy for physical activity is a 12-item measure rated on a scale of 0 to 100%,

assessing how confident individuals are of overcoming barriers to being physically active. For example, participants responded to items such as: "I believe that I can be moderately physically active 5 times per week if…the weather is very bad (hot, humid, rainy, snow, cold)." Task self-efficacy was assessed via a four-item questionnaire where participants indicated their confidence for completing activity-related tasks of increasing difficulty. Similarly, participants also completed an 11-item measure using a scale ranging from 0 ("No Confidence at All") to 100 ("Completely Confident") to assess barriers to eating a well-balanced diet including predominately healthful foods and reduced junk food (e.g., traveling, bringing a meal to work, eating at a restaurant). Previous research supports the reliability of the subscales with alpha coefficients ranging from 0.73 to 0.95 (McAuley & Mihalko, 1998; Newnham-Kanas, 2011).

Treatment Self-Regulation Questionnaires (TSRQ; Williams, Grow, Freedman, Ryan, & Deci, 1996). The TSRQ assesses the autonomous and controlled reasons people choose to engage in some healthy behaviour, try to change an unhealthy one, or follow a treatment protocol (e.g., a weight-loss program; see Appendix M). In this instance, the 18-item, four stemmed questionnaire was administered to assess motivation for entering the CHANGE Study; participants responded to statements using a 7-point Likert format ranging from 1 (Not true at all) to 7 (Very true). Presented with items such as "I decided to enter this weight-loss program because…" or "I plan to lose weight because…" participants were asked to respond based on options that varied in their degree of autonomy. A second version of the TSRQ (labeled TSRQ-C) containing 13 items and two stems was then administered midway through the intervention (i.e., 6-weeks) to assess motivation for continuing to participate in the program. Finally, in order to assess

motivation upon program completion (i.e., at 12-weeks), a third version of the TSRQ was created for the purposes of this study based on the 13-item version. Responses on each version of the TSRQ are averaged at each administration time-point to form an autonomous and controlled regulation score. The TSRQ has been validated previously with acceptable internal consistency (e.g., $\alpha \geq .73$; Levesque et al., 2007), and established as a useful assessment tool across various settings and for different health behaviours.

Perceived Competence Scale (PCS; Williams & Deci, 1996; Williams, Freedman, & Deci, 1998). The PCS is used to determine how competent individuals perceive themselves to be with respect to performing a particular behaviour (see Appendix N). The PCS was developed originally as a short, 4-item questionnaire to assess: (a) glucose levels among diabetes patients (Williams et al., 1998); and (b) how competent medical students felt towards learning material in an interviewing course (Williams & Deci, 1996). The version used in the present study was modified to encompass both of these face valid instruments. That is, participants were assessed pertaining to their perceived competence for a healthy body weight (i.e., 4 items) as well as their competence regarding the CHANGE study learnings (i.e., 4 items). Previous research has demonstrated acceptable internal consistency for perceived competence using the PCS (i.e., $\alpha > 0.80$; Williams et al., 1998; Williams & Deci, 1996).

Dietary Intake (One-day Food Record, Middlesex-London Health Unit, 2010). In order to assess food intake, a 24-hour dietary recall was administered to capture consumption for the day preceding each assessment (see Appendix O). The 24-hour recall is often utilized to obtain mean dietary intakes due to its cost-effectiveness and low responder/interviewer burden (Biro, Hulshof, Ovesen, & Cruz, 2002). According to

previous research, one day has been shown to provide sufficient characterization of a population's average nutrient intake (Posner et al., 1992).

Anthropometry. Waist circumference measurements were obtained following Heart and Stroke Foundation (2010) guidelines whereby the measuring tape is placed at midpoint between the bottom of the ribcage and the iliac crest along the ancillary line. In order to enhance reliability, the same tape was used for all participants at each measurement time-point (Newnham-Kanas et al., 2008). Weight and height were measured using the Tanita BWB-800S Digital Scale and HR-200 Height Rod. This specific scale is noted for its fast, accurate results. Moreover, the movable platform allows for placement in a spacious location which is an important consideration for patients requiring excess room when weighing-in.

Physiological Measures. In order to measure obesity-related physiological determinants, a blood specimen, which included a lipid profile (i.e., cholesterol, triglyceride, and HDL/LDL) and fasting glucose, was obtained. Given the high correlation between excess adiposity and hypertension (Lau et al., 2007), participants were also asked to have their blood pressure and pulse taken.

Procedures

Initial Meeting: Once eligibility was confirmed and individuals agreed to participate, an introductory baseline assessment was scheduled for each participant with the Project Coordinator at a mutually convenient time in the health promotion laboratory. Upon meeting, the participant was provided with a detailed letter of information whereby the nature of the study was explained in addition to the criteria of voluntary participation, anonymity, and confidentiality. Once written informed consent was acquired,

participants were asked to complete the PAR-Q, a demographic information form, and a series of the aforementioned questionnaires. Honesty demands (Bates, 1992) were used during questionnaire distribution in order to limit the effects of social desirability. With the exception of the demographic form, 24-hour food recall, and the PAR-Q, all questionnaires were completed on-line using Survey Monkey®. Following questionnaire completion, height, weight, and waist circumference were measured. If it was determined at this initial meeting that height and weight measurements did not result in a BMI $\geq$ 30kg/m^2 as was self-reported previously, (s)he was not enrolled in the study. Once the anthropometric measurements were acquired, participants were re-directed to the questionnaire desk where they were given additional instructions pertaining to the protocol for their bloodwork and blood pressure/pulse measures (see Appendix P). The method of payment was also determined and exchanged at this time, followed by the provision of Canada's Food Guide to Healthy Eating (Health Canada, 2007), and Canada's Physical Activity Guide to Healthy Active Living (Health Canada, 1998). Participants were instructed to have their bloodwork and blood pressure measures taken within three business days, after which, they were asked to make arrangements with the Project Coordinator to return to the health promotion laboratory briefly so that their group allocation could be disclosed and any necessary materials pertaining to this assignment could be provided.

Dietary Recall. Participants were instructed to list everything that they ate and drank for the day prior to their assessment including all meals, beverages, and snacks. They were also asked to indicate how the food was prepared (e.g., fried, baked, grilled, etc.), whether it was fresh, frozen, or canned, any brand names and known ingredients, as

well as the time and location where the food and drinks were consumed. Standardized measuring utensils (e.g., cups and spoons) were provided to assist with portion size estimations. Upon completion, the participant reviewed the food record with the Project Coordinator or research assistant to confirm the items, clarify, and add details wherever necessary.

Physiological Measures. Once the initial meeting with the researcher was complete, participants were given instructions pertaining to collection of their physiological measures. For the bloodwork, participants were provided with a requisition and directed to the hospital which was located on campus and within walking distance from the health promotion lab. Because the nature of the specimen required that participants fast from midnight the night prior to collection, and due to the fact that the hospital lab test centre was open during business hours only, individuals were asked to check-in to have their blood taken between 8 and 11am on a weekday. Participants were invited to drink water the morning of their specimen collection and advised to bring a snack for afterwards.

In order to obtain a blood pressure and pulse measure, participants were directed to the blood pressure machine located within the pharmacy section of a local drug store chain. Instructions were provided and participants were asked to record both the top and the bottom number on the sheet provided. In addition, participants were asked to have their blood pressure taken under the same circumstances, around the same time of day, and by the same blood pressure machine at each assessment time-point.

Intervention Assignment and Commencement: Following acquisition of the physiological measures, participants contacted the Project Coordinator via e-mail or text

to schedule a drop-in session so that s/he could ascertain his/her group assignment and pick-up any pertinent materials. In the interim, the Project Coordinator contacted the CPCC or Specialist assigned to the participant in order to advise that a match had been made, and provide the necessary contact information. Upon returning to the health promotion lab for this five-minute meeting, individuals assigned to the MI-via-CALC group were provided with a very brief explanation regarding the Co-Active condition (i.e., that they would be working with a CPCC to explore their goals and determine how to go about achieving them) and asked to think in advance about an area in their lives where they wanted to make a change. They then received the contact information for their coach (i.e., name, phone number, and e-mail address), a phone card if the coach did not live in the local calling area, and a tracking sheet to record the date and time of each phone call. Participants were asked to contact their coach within two days to arrange their first session and then notify the Project Coordinator with this date once it was confirmed so that an estimate of weekly progress could be made in service of booking future assessments. For participants assigned to the LEARN condition, an explanation was provided pertaining to the origin and purpose of the program and a workbook containing LEARN monitoring forms, charts, and worksheets was distributed. Participants were then given the contact information for their Specialist which included his/her first name and a generic e-mail address created for the study. Similar to the MI-via-CALC group, participants were asked to contact the Specialist within two days to arrange the first lesson and notify the Project Coordinator with this date once it was confirmed (see Appendix Q).

Follow-up Assessments: The protocol administered at the initial meeting was carried out for the subsequent assessments (i.e., mid-point at 6-weeks, post-intervention at 12-weeks, and at the 3 and 6 month follow-ups); all of the aforementioned measures were also collected at each time-point with the exception of height (baseline only), and bloodwork (collected at every time-point except for 6-weeks). Feedback was provided by participants via an open-ended questionnaire upon exiting the study to explore their experiences (i.e., pertaining to positive and negative attributes of each treatment and recommendations for future). This same open-ended format was also applied at the 3 and 6-month follow-up assessments (see Appendix R).

Data Analysis

Primary analysis of the data involved multiple 2 (Group) X 5 (Time) repeated measures ANOVAs. Group (MI-via-CALC, LEARN) was a between subjects variable and time (baseline, mid, post-intervention, three and six month follow-up) was a within subjects variable. The dependent variables were the various physiological measures, as well as the scores on the psychological questionnaires. SPSS was used to conduct these analyses. Inductive content analysis (Patton, 1987) was employed to examine the open-ended feedback provided by participants upon exiting the study and for the subsequent follow-up time-points.

Discussion

Through this paper, a methodological account of a comprehensive study examining the impact of two goal-setting based treatments for obesity among university students has been detailed. To our knowledge, this is the first large-scale MI-via-CALC study to incorporate specific measures of physiological obesity-determinants (i.e., a lipid

panel, fasting glucose, and blood pressure), and the inclusion of a validated comparison group. Moreover, this study is also the first of its kind to adapt the LEARN Program for Weight Management to be delivered over the telephone. All of the pertinent information necessary to develop and implement a similar intervention has been addressed including the study design, treatment and population rationales, recruitment methods, outcome measure descriptions, and procedural details pertaining to the interventions themselves. Seventy-eight university students with obesity were enrolled in the CHANGE program. It is expected that results from the study will be available in 2012.

As noted previously, an important consideration when examining MI-via-CALC as a treatment for obesity is that it is typically delivered over the telephone. Not only is this convenient, but it allows individuals to obtain one-on-one support from a certified coach while remaining in the privacy of their own homes when discussing personal issues which may be at the root of their weight struggles. Previous researchers in other areas of health, such as smoking cessation, have examined the impact of telephone counseling-based interventions for behaviour change in at-risk populations and found that they are cost-effective, beneficial for those looking to obtain help, and able to reach a wide range of individuals (e.g., Stead, Perara, & Lancaster, 2009). Given that this project is the first of its kind, that is, a large-scale study examining the impact of MI-via-CALC in this at-risk population, it is hoped that the results will be utilized to inform the development of such future population-based approaches which are both accessible and warranted in order to address this growing epidemic.

Because goal setting represents an integral component of both the MI-via-CALC and LEARN approaches, and because goal setting has been associated positively with

physical activity and nutrition-based behaviour change, a systematic review was undertaken to examine the utility of this strategy. Specifically, this entailed an exploration of community-based studies targeting adults with overweight and obesity in order to elucidate which intervention features elicit optimal health behaviour change outcomes. This review comprises the ensuing chapter.

References

Bates, B. (1992). The effect of demands for honesty on the efficacy of the Carleton Skills-Training Program. *International Journal of Clinical and Experimental Hypnosis*, *40*, 88-102.

Biro, G., Hulshof, K. F. A. M., Ovesen, L., & Cruz, J. A. A. (2002). Selection of methodology to assess food intake. *European Journal of Clinical Nutrition, 56*, S25-32.

Blascovich, J, & Tomaka, J. (1993). Measures of self-esteem. In J. P. Robinson, P. R. Shaver, and L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes, Third Edition,* (pp. 115-160). Ann Arbor: Institute for Social Research.

Bodenheimer, T., & Handley, M. A. (2009). Goal-setting for behaviour change in primary care: An exploration and status report. *Patient Education and Counse*ling, *76*, 174-180.

Brownell, K. D. (2004). The LEARN Program for Weight Management (10th ed.). Dallas, Tx: American Health Publishing.

Brug, J., Oenema, A., & Ferreira, I. (2005). Theory, evidence and Intervention Mapping to improve behaviour nutrition and physical activity interventions. *International Journal of Behavioural Nutrition and Physical Activity, 2*(2).

Canadian Council on Learning (2006). Post-secondary education in Canada: Strategies for success. Retrieved November 7, 2008, from http://www.ccl cca.ca/NR/ rdonlyres/25B8C399-1EA3-428A-81A1-C8D8206E83C6/0/PSEFull ReportENLR16july08Bookmark.pdf

Canadian Society for Exercise Physiology (2002). *The Physical Activity Readiness Questionnaire*. Retrieved from http://uwfitness.uwaterloo.ca/PDF/par-q.pdf.

Clement, J.M., Schmidt, C.A., Bernaix, L.W., Covington, N.K., & Carr, T.R. (2004). Obesity and physical activity in college women: Implications for clinical practice. *Journal of the American Academy of Nurse Practitioners, 16*(7), 291-299.

Coaches Training Institute Co-Active Network (2011). *Co-active Network main community.* http://www.coactivenetwork.com/

Craig, C. L., Marshall, A. L, Sjöström, M., Bauman, A. E., Booth, M. L, Ainsworth, B. E., …Oja, P. (2003) International physical activity questionnaire (IPAQ): 12-country reliability and validity. *Medicine and Science in Sports and Exercise, 35*, 1381-1395.

Cullen, K. W., Baronowski, T., & Smith, S. P. (2001). Using goal setting as a strategy for dietary behaviour change. *Journal of the American Dietetic Association, 101*, 562-566.

Fishbein, M., & Yzer, M. C. (2003). Using theory to design effective health behaviour interventions. *Communication Theory, 13*(2), 164-183.

Foster, G. D., Makris, A. P., & Bailer, B. A. (2005). Behavioural treatment of obesity. *American Journal of Clinical Nutrition, 82*(suppl), 230S-5S.

Health Canada (1998). *Canada's physical activity guide to healthy active living*. H39-429/1998-1E. Ottawa, ON, Health Canada.

Health Canada (2003). *Canadian guidelines for body weight classification in adults.* Retrieved from http://www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/nutrition/weight_book-livres_des_poids-eng.pdf

Health Canada (2007). *Eating well with Canada's food guide*. H164-38/1-2007E. 2007. Ottawa ON, Health Canada.

Heart and Stroke Foundation (2010). *Healthy waists*. Retrieved November 22, 2011, from http://www.heartandstroke.on.ca/site/c.pvI3IeNWJwE/b.4018281/k.8698/Healthy_Waists.htm

Hill, J. O., & Peters, J. C. (1998). Environmental contributions to the obesity epidemic. *Science, 280*, 1371-1374.

ICF (2011). Coaching frequently asked questions. Retrieved November 12, 2011 from http://www.coachfederation.org/clients/coaching-faqs/

Irwin, J. D., & Morrow, D. (2005). Health promotion theory in practice: an analysis of Co-Active coaching. *International Journal of Evidence Based Coaching and Mentoring, 3*(1), 29-38.

Katzmarzyk, P. T. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. *Canadian Medical Association Journal, 176*(8), 17-32.

Katzmarzyk, P. T., Craig, C. L., & Bouchard, C. (2001). Underweight, overweight and obesity: Relationships with mortality in the 13-year follow-up of the Canada Fitness Survey. *Journal of Clinical Epidemiology, 54*, 916-920.

Katzmarzyk, P. T. & Janssen, I. (2004). The economic costs associated with physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology, 29*(1), 90-115.

Lau, D. C. W., Douketis, J. D., Morrison, K. M., Hrmiak, I. M., & Sharma, A. M. (2007).

2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *Canadian Medical Association Journal, 176*(8), 1-13.

Lee, C. J. (2004). Horatio (Version 3.0) [Computer Software]. Faculty of Health Sciences, The University of Western Ontario, London, Canada: Author.

Levesque, C. S., Williams, G. C., Elliot, D., Pickering, M. A., Bodenhamer, B., & Finley, P. J. (2007). Validating the theoretical structure of the Treatment Self-Regulation Questionnaire (TSRQ) across three different health behaviors. *Health Education Research, 22*(5), 691-702.

Locke, E. A., & Latham, G. P. (2006). New directions in goal setting theory. *Association for Psychological Science, 15*(5), 265-68.

Luo, W., Morrison, H., deGroh, M., Waters, C., DesMeules, M., Jones-McLean, E., … Mao, Y. (2007). The burden of adult obesity in Canada. *Chronic Diseases in Canada, 27*(4), 135-144.

McAuley, E. & Mihalko, S.L. (1998). Measuring exercise-related self-efficacy. In J. L. Duda (Ed.), *Advances in Sport and Exercise Psychology Measurement* (pp. 371-380). Morgantown, WV: Fitness Information Technology Inc.

Middlesex-London Health Unit (2010). *One-day Food Record.* Chronic Disease and Injury Prevention Team.

Miller, W. R., & Rollnick, S. (2002). *Motivational Interviewing: Preparing people for change* (2nd ed.). New York, NY: The Guildford Press.

Newnham-Kanas, C. E. (2011). Motivational coaching: Its efficacy as an obesity

intervention and a profile of professional coaches (Unpublished doctoral dissertation). The University of Western Ontario, London, Ontario, Canada.

Newnham-Kanas, C. E., Gorczynski, P., Irwin, J. D., & Morrow, D. (2009). Annotated bibliography of life coaching and health research, *International Journal of Evidence Based Coaching and Mentoring, 7*(1), 39 – 103.

Newnham-Kanas, C. E., Irwin, J. D., & Morrow, D. (2008). Co-Active life coaching as a treatment for people with obesity. *International Journal of Evidence Based Coaching and Mentoring, 6*, 1-12.

Newnham-Kanas, C., Irwin, J. D., Morrow, D., & Battram, D. (2011).The quantitative assessment of Motivational Interviewing using Co-Active life coaching skills as a treatment for adults struggling with obesity. *International Coaching Psychology Review*, *6*(2), 211-225.

Newnham-Kanas, C., Morrow, D., & Irwin, J. D. (2010). Motivational coaching: A functional juxtaposition of three methods for health behaviour change: Motivational interviewing, coaching, and skilled helping. *International Journal of Evidence Based Coaching and Mentoring, 8*(2), 27-48.

Patton, M. (1987). How to use qualitative methods in evaluation. Sage: London.

Pearson, E. (2012). Goal setting as a health behaviour change strategy in overweight and obese adults: A systematic literature review examining intervention components. *Patient Education and Counseling, 87*, 32-42.

Pearson, E. (2011). The 'how to' of health behaviour change brought to life: A theoretical analysis of the Co-Active coaching model and its underpinnings in self-

determination theory. *Coaching: An International Journal of Theory, Research and Practice, 4*(2), 89-103.

Posner, B. M., Martin-Munley, S. S., Smigelski, C., Cupples, L. A., Cobb, J. L., Schaefer, E., … D'Agostino, R. B. (1992). Comparison of techniques for estimating nutrient intake: The Framingham study. *Epidemiology, 3*, 171-177.

Rollnick, S. & Miller, W. R. (1995). What is motivational interviewing? *Behavioural and Cognitive Psychotherapy, 23*, 325-334.

Rosenberg, D. E., Bull, F. C., Marshall, A. L., Sallis, J. F., & Bauman, A. E. (2008). Assessment of sedentary behaviour with the international physical activity questionnaire. *Journal of Physical Activity and Health, 5*(1), 30-44.

Rosenberg, M. (1965). *Society and the Adolescent Self-Image*. Princeton, New Jersey: Princeton University Press.

Rosenberg, M. (1989). *Society and the Adolescent Self-Image*. (Rev. ed.). Middletown, CT: Wesleyan University Press.

Rothman, A. J. (2004). "Is there nothing more practical than a good theory?": Why innovations and advances in health behaviour change will arise if interventions are used to test and refine theory. *International Journal of Behavioural Nutrition and Physical Activity, 1*(11). doi:10.1186/1479-5868-1-11

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on self-determination theory. *The European Health Psychologist, 10*, 2-5.

Sharma, M. (2007). Behavioural interventions for preventing and treating obesity in adults. *Obesity Reviews, 8*, 441-449.

Shields, M., Carroll, M. D., & Ogden, C. L. (2011). *Adult obesity prevalence in Canada and the United States* (Data Brief No. 56). Retrieved from National Center for Health Statistics website: http://www.cdc.gov/nchs/data/databriefs/db56.htm

Shilts, M. K., Horowitz, M., & Townsend, M. S. (2004). Goal setting as a strategy for dietary and physical activity behaviour change: a review of the literature. *American Journal of Health Promotion, 19*(2), 81-93.

Statistics Canada. (2006). *Health Reports* (Catalogue no. 82-003-XPE, 17(3)). Ottawa, Ontario, Canada: Health Statistics Division.

Stead, L. F., Perara, F., & Lancaster, T. (2009). Telephone counseling for smoking cessation. *Cochrane Database of Systematic Reviews* 2006, Issue 3. Art. No.: CD002850. DOI: 10.1002/14651858.CD002850.pub2.

Stewart-Brown, S., Evans, J., Patterson, J., Petersen, S., Doll, H., Balding, J., & Regis, D. (2000). The health of students in institutes of higher education: An important and neglected public health problem? *Journal of Public Health Medicine, 22*(4), 492-499.

Strecher, V. J., Seijts, G. H., Kok. G. J., Latham, G. P., Glasgow, R., DeVellis, B., ... Bulger, D. W. (1995). *Goal setting as a strategy for health behaviour change*. Health Education Quarterly, *22*(2), 190-200.

Strychar, I. (2004). Fighting obesity: A call to arms. *Canadian Journal of Public Health, 95(1),* 12-14.

Tremblay, M. S., Katzmarzyk, P. T., & Willms, J. D. (2002). Temporal trends in overweight and obesity in Canada, 1981-1996. *International Journal of Obesity, 26*, 538-543.

van Zandvoort M., Irwin, J. D., & Morrow, D. (2008). Co-Active coaching as an intervention for obesity among female university students. *International Coaching Psychology Review, 3*(3), 191-206.

van Zandvoort M., Irwin J. D., & Morrow D. (2009). The impact of Co-active life coaching on female university students with obesity. *International Journal of Evidence-Based Coaching and Mentoring, 7*(1), 104-118.

Wadden, T. A., Berkowitz, R. I., Womble, L. G., Sarwer, D. B., Phelan, S., Cato, R. K., … Stunkard, A. J. (2005). Randomized trial of lifestyle modification and pharmacotherapy for obesity. *The New England Journal of Medicine, 353*(20), 2111-20.

Ware, J. D. *SF-36 Health Survey Update*. *Accessed* on November 20, 2008, from http://www.sf-36.org/tools/sf36.shtml#LIT

Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70*, 767-779.

Williams, G. C., Freedman, Z. R., & Deci, E. L. (1998). Supporting autonomy to motivate glucose control in patients with diabetes. *Diabetes Care, 21*, 1644-1651.

Williams, G. C., Grow, V. M., Freedman, Z., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight-loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70*, 115-126.

Wilson, P. W. F., D'Agostino, R. B., Sullivan, L., Parise, H., & Kannel, W. B. (2002). Overweight and obesity as determinants of cardiovascular risk: The Framingham experience. *Archives of Internal Medicine, 162*, 1867-1872.

Womble, L. G., Wadden. T. A., McGuckin, B. G., Sargent, S. L., Rothman, R. A., & Krauthamer-Ewing, E. S. (2004). A randomized controlled trial of a commercial internet weight loss program. *Obesity Research, 12*(6), 1011-18.

Whitworth, L., Kimsey-House, K., Kimsey-House, H., Sandahl, P. (2007). *Co-Active coaching: New skills for coaching people toward success in work and life* (2nd ed.). California: Davies-Black Publishing.

WHO (2011a). *Obesity and overweight.* Retrieved November 12, 2011, from http://www.who.int/mediacentre/factsheets/fs311/en/index.html

WHO (2011b). *Controling the global obesity epidemic*. Retrieved November 12, 2011, from http://www.who.int/nutrition/topics/obesity/en/

WHO (1986). *First international conference on health promotion.* Ottawa, Canada.

Article 2

Goal Setting as a Health Behaviour Change Strategy in Overweight and Obese Adults: A Systematic Literature Review Examining Intervention Components[2]

Overweight and obesity rates have more than doubled among adult Canadians over the past two decades. According to recent reports (Public Health Agency of Canada, 2009; Statistics Canada, 2010), 61% of residents aged 18 or older are now either overweight (Body Mass Index [BMI] > 25kg/m^2; 37%), or obese (BMI > 30kg/m^2; 24%). Overweight and obesity have been linked to a wide range of chronic illnesses and preventable conditions (Health Canada, 2003; Luo et al., 2007; Wilson, D'Agostino, Sullivan, Parise, & Kannel, 2002) to which one in ten premature deaths can be attributed (Lau et al., 2007). Coupled with personal health risk, this growing trend is indicative of the serious nature of this epidemic which threatens to overwhelm a health care system that is already extended beyond its means (Balkau, Bassand, Barter, & Wittchen, 2007). A greater understanding of the strategies employed by individuals seeking weight loss is imperative for enhancing positive efforts to reduce these soaring rates. Given that the fundamental cause of overweight and obesity has been attributed to a long-term positive energy balance resulting from over-nutrition and sedentary living (Hill & Peters, 1998; Katzmarzyk, 2002; Papas et al., 2007), it is not surprising that lifestyle interventions aimed at modifying dietary and physical activity behaviours have been identified as the cornerstone of treatment for these conditions (Lau et al., 2007).

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Interventions conducted from a health promotion (World Health Organization [WHO], 1986) perspective (i.e., the process of enabling individuals to improve and increase control over their own health), have been shown to contribute to the success of altering health behaviours (Irwin & Morrow, 2005). The Ottawa Charter for Health Promotion states that a key feature of health promotion action includes the development of personal skills (WHO, 1986). This is accomplished, in part, through the provision of health information and education as well as the enhancement of life skills. As a result, individuals are able to choose from a wider array of options thereby enhancing their ability to exercise more control over their own health and environments. Moreover, enabling individuals to learn to cope with varying situations is essential because it fosters empowerment and the ability to make better informed health-related choices (WHO, 1986). These tenets have important implications when considering potential avenues for implementing weight loss initiatives in overweight and obese populations.

One strategy that has shown promise in the literature as a useful method for eliciting behaviour change is goal setting (Estabrooks et al., 2005; Shilts, Horowitz, & Townsend, 2004). Goals refer to inherently valued, futuristic outcomes that are derived from a level of dissatisfaction with a present condition or circumstance (Locke & Latham, 2006). The process of goal setting involves the use of educational principles to bring a particular action or accomplishment to fruition (Lee, Locke, & Latham, 1989; Locke & Latham, 2002). According to Locke and Latham (2002), goals affect performance through four mechanisms: (1) goals direct effort and attention towards activities that are goal-relevant and away from those that are irrelevant; (2) goals serve in an energizing capacity in that higher set goals lead to greater effort expenditure and better

performance than lower set goals; (3) goals impact persistence; harder goals can prolong effort; and (4) goals can affect actions indirectly through the discovery and/or the application of task-related strategies and knowledge. Through these mechanisms individuals acquire various skills which enable them to adjust their plans and actions to optimize goal attainment. A large body of seminal goal setting research has been conducted in organizational and sports settings, and has focused on outcomes pertaining to productivity, learning, and performance (Locke & Latham, 2002; Weinberg, 1994). For example, Locke and Latham (2002) summarized 35 years of empirical support for the effectiveness of goal setting with respect to employee motivation in the field of organizational psychology. Goal setting was found to elicit performance increases on over 100 different tasks involving more than 40,000 participants in a variety of countries and settings. Further, a meta-analysis of 36 studies conducted by Kyllo and Landers (1995) examined the effects of goal setting on performance in sport and exercise domains. In these contexts, results revealed that goal setting is effective at improving performance (effect size = 0.34) and the process can be enhanced through goals that are set specifically, in the short and long term, by the individuals themselves, and made public to others.

Within the realm of health care, it is only in recent decades that goal setting has been examined more thoroughly and used as a method to invoke positive behaviour change (Strecher et al., 1995). A review of the literature conducted by Shilts and colleagues (2004) examined the effectiveness of goal setting as a strategy for dietary and physical activity behaviour change; in several adult studies, positive effects on behaviours were reported including increased fibre consumption, decreased fat intake,

and higher exercise adherence. In addition, goal setting has been used as a means to reduce medical and lifestyle health-risks such as high blood sugar, alcohol use, stress, and cigarette smoking (Roher, Naessens, Liesinger, Tulledge-Scheitel, & VanHouten, 2010). Studies have also employed goal setting for chronic disease management (e.g., diabetes, hyptertension), an area where many health outcomes are determined heavily by adherence to specific dietary, physical activity, and/or medication protocols (Brown, Bartholomew, & Naik, 2007; DeWalt et al., 2009; Estabrooks et al., 2005; Naik et al., 2011).

As health professionals and researchers, it is important to be mindful of cost-effective interventions that could prove to be efficacious in reducing the rates of and sequelae associated with overweight and obesity. This is especially the case for interventions that take place beyond a primary care or clinical setting. Community-based interventions have the potential to reach a wide segment of the population, and provide a realistic setting for participants to undergo lifestyle changes (Economos & Irish-Hauser, 2007). This can be important when considering the barriers to behaviour change that are often encountered by individuals who are trying to obtain a healthy weight in their own environments (Greaney et al., 2009). Because a large body of research on goal setting has been conducted in various settings (e.g., organizational, laboratory, primary care), the strategies and tools that are utilized in this process vary considerably and it is not entirely clear which components, in particular, are more or less effective with respect to improving outcomes. Moreover, no streamlined approach appears to exist for setting health behaviour-related goals (Bodenheimer & Handley, 2009; Cullen, Baronowski, & Smith, 2001; Strecher et al., 1995) among individuals in community-based settings which

is an important consideration when examining potential avenues to ameliorate overweight and obesity rates.

Given its demonstrated utility in other settings, and the amenable health behaviours that have been identified as salient contributors to the current obesity epidemic, it stands to reason that goal setting may be a tangible method for amelioration. From an evaluative perspective, the use of goal setting in overweight and obese populations and its subsequent impact on dependent measures (e.g., weight) has yet to be examined systematically. It would appear that a descriptive review aimed at deconstructing the processes and components involved in these types of interventions is timely. Thus, the primary purpose of this paper is to examine goal setting as a behaviour change strategy specific to diet and physical activity in community-based interventions targeting overweight and obese adults. Specifically, an analytical exploration of the components used within these types of interventions is undertaken in order to elucidate the salient combination of features that will elicit optimal behavioural outcomes.

Methods

Evaluation Criteria

The START (Specificity, Timing, Acquisition, Rewards and feedback, and Tools) evaluation criteria have been developed for the purposes of this paper based on and extrapolated from: a) the SMART criteria (Doran, 1981) which espoused that managerial objectives in a business context be made Specific, Measurable, Assignable, Realistic, and Time-related; and b) properties identified in the literature as important facets of goal setting interventions (Bodenheimer & Handley, 2009; Locke & Latham, 2002; Shilts et al., 2004; Strecher et al., 1995). The START criteria (explained below) will be used to

explore the components and structures of studies that emanate from this particular review with a view towards establishing a streamlined process for the evaluation and development of future health-related behaviour change interventions incorporating a goal setting component.

Specificity. Goal level specificity plays an important role in determining incentives for achievement and guidelines for performance (Bandura & Simon, 1977). Goals that are specific have been shown consistently to lead to higher levels of performance than "do your best goals" (i.e., urging people to do their best) which are more general and provide no external referent to determine progress (Locke & Latham, 2002). For goals that are defined explicitly, the type and amount of effort required for achievement is more pronounced, thus reducing the ambiguity of the task, rendering achievement of the goal more likely (Bandura & Simon, 1977; Foster, Makris, & Bailer, 2005; Locke & Latham, 2002). Moreover, multiple studies have demonstrated that people perform better when goals are set higher and made more challenging (Shilts et al., 2004; Strecher et al., 1995). However, it is important to note that setting goals which are too complex can, in fact, impact self-efficacy negatively thus impairing subsequent task performance (Strecher et al., 1995).

Timing. The effectiveness of behavioural change intentions is related directly to how far into the future a goal is projected (Bandura & Simon, 1977). Goals that are set proximally (i.e., short-term) are directive and serve as incentive for immediate action. Achievement of goals set in the short-term can enhance motivation to strive towards further action; making small changes provides individuals with successes on which to build (Foster et al., 2005). Alternatively, distal (i.e., long-term) goals are often too far

removed in time and do not provide an adequate indication of progress, thereby enhancing the likelihood of procrastination or complete abandonment (Bandura & Simon, 1977). Goal setting research has shown that individuals who set specific, proximal goals have a greater likelihood of success than those who set distal goals (Bodenheimer & Handley, 2009). Moreover, additional studies have supported the inclusion of goals that are set in both the short and long term, thus demonstrating that a combination of the two is more effective at enhancing performance than long-term goals set in isolation (Kyllo & Landers, 1995).

Acquisition. How an individual comes to acquire or set a particular goal can be a function of its being assigned, self-determined, or set collaboratively. In a review conducted by Locke and Latham (2002), it was revealed that a large body of workplace goal setting literature supports the notion that performances are similar irrespective of how a goal is set. However, in the field of health, there is an increasing amount of evidence which suggests that self-determined and collaboratively set goals are more effective for eliciting behaviour change than goals that are assigned (Estabrooks et al., 2005). The rationale behind this evidence has roots in self-determination theory (SDT) which considers the perceived forces that move individuals to act through differentiated types of motivation (Ryan & Deci, 2000). SDT posits that performance and persistence are more likely to be enhanced when behaviours (i.e., goals) are self-authored or the result of authentic motivation as opposed to externally driven. Assigned behaviours or goals in this context are often viewed as a form of external pressure (e.g., guilt), and resultant efforts and performance are subsequently less efficacious (Ryan & Deci, 2000).

Rewards and feedback. Incentives or rewards provided can be internal (e.g., pride in accomplishment) or external (e.g., monetary) and both can play a motivating role in eliciting health behaviour change. However, several contingencies can occur as a result of focusing on external outcomes exclusively (e.g., decreases in self-efficacy and performance when rewards are not obtained due to goal difficulty; a reward system may not exist in the "real world" upon program completion) and mixed findings exist regarding the value of implementing a goal-reward based system (Locke & Latham, 2002; Shilts et al., 2004; Strecher et al., 1995).

The importance of feedback through either personal or technological avenues provided at various time-points has been identified as an integral component of successful goal attainment (Locke & Latham, 2002; Strecher et al., 1995). In order for behaviour change to be effected, individuals need regular feedback and encouragement regarding accuracy and progress relative to their goals and achievement. Once this occurs, adjustments in effort and performance can be made accordingly (Locke & Latham, 2002; Neubert, 1998).

Tools. According to Strecher and colleagues (1995), research examining the specific elements of goal setting in health behaviour change interventions is needed. Several tools such as action planning, self-monitoring, and education sessions have been identified in the goal setting literature and used to assist in bringing desired outcomes to fruition (Pettman et al., 2008). With respect to overweight and obesity, identifying commonalities across goal setting interventions may be useful in further delineating the integral components required for successful health behaviour change.

Inclusion and Exclusion Criteria

Criteria for inclusion in the review required that the studies: (a) utilized goal setting as the primary intervention or principal component thereof for effecting dietary and/or physical activity behaviour change; (b) targeted an overweight and/or obese adult population based on relevant BMI values, or adults (i.e., > 18 years old) who self-identified a need for weight loss as confirmed by the researchers; (c) occurred in a non-primary care setting whereby participants were self-referred from the local community; and (d) were published in English before January 2010. Studies that included goal setting as an ancillary component of a larger intervention (i.e., stated that goal setting was used but did not articulate how), focused on a paediatric or adolescent sample, applied goal setting with a view towards improving a chronic condition (e.g., diabetes) in overweight and/or obese individuals, sought to elicit behaviour change in combination with a pharmacologic or surgical treatment, or took place in a primary care setting where the intervention was delivered by health care professionals (e.g., physician, nurse practitioner, case manager, nurse) were excluded.

Search Methods

In order to acquire pertinent literature, a search for articles was conducted using eight databases considered relevant to the scope of the research question: Medline, CINAHL, PsycINFO, SCOPUS, EMBASE, Web of Science, ProQuest Nursing Journals, and Physical Education Index. Strategies employed to obtain the articles involved the utilization of both subject headings and key words informed by various combinations of the following search terms: obesity, overweight, weight, goal setting, behaviour/or change, and health behaviour/or. The resultant titles and abstracts were identified and

reviewed by the author. Seventy-eight studies incorporated goal setting as a behaviour change component and were deemed as potentially appropriate; the full-texts were retrieved to determine further the purpose, sample, and intervention methodology. In addition, the reference pages of relevant literature were examined manually to identify supplementary articles. Subsequently, a total of 18 studies were selected on the basis that they met the aforementioned inclusion criteria (Table 1). They were then assessed to identify specific study details (e.g., participant demographics, procedural methods) and how the START criteria were incorporated in relation to goal setting within the interventions (Table 2).

Table 1. Description of goal setting studies (1977-2009) targeting adults with overweight and obesity

Authors (Date)	Overweight/Obesity Criteria, Demographics and Study Duration	Study Purpose	Intervention Details	Outcomes
Bandura & Simon (1977)	At least 25% above ideal body weight *n* = 66 (57 female, 9 male); M % overweight = 50; M age = 43 1 week baseline plus 4 week treatment phase	To examine the effects of goal proximity on self-regulation in relation to eating behaviour and body weight	Random assignment to 1/4 conditions: ▪ *Self-monitoring* (SM) – recorded mouthfuls to measure cumulative food intake ▪ *Distal Goal setting* (DG) – given progressive goal to reduce food intake by 10% each week for 4-weeks ▪ *Proximal Goal Setting* (PG) – given progressive goal to reduce daily food intake by 10% compared to baseline and by an additional 10% each successive week ▪ *Control* (C) – No treatment Wrist counter provided to tally mouthfuls Self-monitoring records submitted weekly	▪ Many subjects in DG self-assigned proximal goals to gain control over behaviours ▪ Reduction in food/beverage consumption higher in DG and PG compared with SM ▪ DG and PG had significant weight reductions; SM and C gained weight ▪ PG produced greater changes in weight and eating behaviour compared with DG or SM ▪ Subjects with explicit goals were more motivated and lost more weight
Burnett et al. (1985)	Female subjects who were at least 35% overweight *n* = 12; M weight = 190.8lb; M age = 41.5 8-week intervention with 24 and 40 week follow-ups	To explore the relation between weight-related behaviour change and weight loss specific to two treatment procedures employing goal setting strategies	Goals set weekly with assistance of study therapist Random assignment to either: ▪ A*mbulatory computer (A) or Paper-and-pencil (P)* group for self-monitoring of physical activity and caloric intake behaviours ▪ The A MI-via-CALCulated caloric and activity values and provided: self-monitoring reminders, suggestions, feedback on progress, praise for meeting/exceeding goals, and instructions for setting higher goals ▪ P group participants recorded and calculated behaviours manually and did not receive additional reminders or instructions	▪ A subjects lost 2.5 times more weight than P subjects (mean = 8.1lb vs 3.3lb) over the 8-week intervention ▪ Significant weight loss differences were found between groups at 24 (A = 15.67lb; P = 4.17lb) and 40 weeks (A = 17.67lb; P = 2.34lb) ▪ Mean self-reported caloric intake decreased from pre to post treatment for both groups while mean self-reported physical activity units increased
Chapman & Jeffrey (1978)	Women above ideal body weight *n* = 57; M % overweight = 45.4;	To compare the effects of self-monitoring, goal setting, and reward	Random assignment to 1/3 groups: Each group met weekly for 90 minutes ▪ *Situational Management (*SM) – education on environmental eating cues, diet, and exercise; self-monitoring instructions provided	▪ All groups lost significant amounts of weight during treatment and follow-up ▪ SS lost significantly more weight than SM (9.44lb vs 5.16lb) ▪ Out of 19 behaviour change techniques,

	M age = 37.8 8 week treatment and 8 week follow-up period	provision on weight change and eating habits	▪ *Self-Standard Setting Group* (SS) – same as SM plus wrote down specific weekly goals for changes in weight/eating behaviours ▪ *Self-Reward Group* (SR) – same as SM and SS; made self-contracts; received rewards contingent on weight losses and eating behaviour achievements	setting goals was rated most helpful by SS and SR; SR rated rewarding self and being rewarded by others as least helpful ▪ Significant correlations between weight change and goal setting for eating habits found for SS and SR
Jarvie & Thompson (1985)	Moderately overweight adults *n* = 16 (12 female, 4 male); M % overweight = 15-30% 17-week program	To assess the efficacy of written instructions plus lecture and goal setting on home-based stationary exercycle use for weight loss	Random assignment to Group A or wait-list control: ▪ All subjects received verbal information on aerobic exercise, how to use the cycle, check pulse, and increase intensity/frequency over time ▪ Instructional booklets were provided detailing heart rate formulas; emphasized importance of maintaining a high heart rate during exercise ▪ Subjects kept a diary and recorded activity frequency, intensity, and duration, pulse rates, moods, etc. (mailed weekly to researchers) ▪ *Wait-list* – in addition to above, received specific schedule of graded increases in duration (i.e., goal of 20-30 minutes/day over 4 weeks) and intensity (i.e., resistance increase every 2 weeks)	▪ Subjects did not increase intensity and duration over intervention as prescribed; none of the subjects lost weight ▪ Diaries indicated that subjects found the cycles boring; others rode frequently but maintained sub-aerobic intensities ▪ Verbal instruction, written instruction, and goal setting were found to be ineffective in promoting aerobic use of the exercycles and weight loss
Dubbert & Wilson (1984)	15lb overweight and not more than 100% overweight *n* = 62 (48 female, 14 male) plus their spouses; M weight = 205lb; M % overweight = 48.1 19-week program with 6, 12, and 30 month follow-ups	Evaluated two types of goal setting (proximal/ daily vs distal/ weekly) and 2 levels of spouse involvement (couples vs individual)	Program began with 4-week education phase Random assignment to 1/4 treatment conditions: ▪ *Couples treatment/ proximal goals; Couples treatment/distal goals; Individual treatment/proximal goals; Individual treatment/ distal goals* Aerobic exercise and calorie counting prescriptions given to subjects at first treatment session (week 5) Weekly treatment sessions involved weigh-ins, review of self-monitoring records and goals from previous week, and problem-solving discussions Printouts showing progress provided to participants Contract forms provided in couples groups to encourage commitment to behaviour change	▪ Body weight, percent overweight, and body fat decreased; cardiovascular fitness improved significantly up to 6-months post treatment for all subjects ▪ Adherence to caloric self-monitoring correlated with weight loss significantly ▪ Subjects following a daily/weekly goal setting strategy lost significantly more weight than those who set no goals ▪ The 2 goal strategies did not differ significantly from each other ▪ Spousal involvement did not result in greater weight loss for participants

Jeffery et al. (2003)	Overweight of 14-32 kg *n* = 202 (58% women); M BMI = 31.7; M age = 42.2 18-month intervention	To evaluate the impact of varying exercise levels on short and long term weight-loss outcomes	Random assignment to 1/2 treatment groups: ▪ *Standard Behaviour Therapy* (SBT) – Diet/behaviour control education plus prescribed progressive energy expenditure (EE;1000kcal/week) and caloric reduction goals (1000-1500/day) ▪ *High Physical Activity* (HPA) – same education as SBT plus prescribed EE of 2500 kcal/week ▪ HPA group were: encouraged to recruit family members/friends to participate in activity; provided with exercise coaches to assist with prescriptions and provide encouragement; given monetary incentives for achieving goals	▪ Subjects in the HPA group increased their EE significantly compared with the SBT group at all time-points ▪ Greater weight losses occurred in the HPA group at all time points; significant differences observed between groups at 12 and 18 months ▪ Both groups reported significant declines in energy intake despite not achieving the prescribed goals ▪ Higher EE prescriptions promote long-term weight loss better than conventional recommendations
Baron & Watters (1981)	A desire to lose 15lb *n* = 60 (46 female, 14 male); M weight = 159.17lb; M % overweight = 28.11; M age = 25.4 4-week intervention	Examined the effectiveness of self-monitoring of caloric intake on weight loss as a function of setting different goal levels	All subjects given daily self-monitoring cards (handed in weekly post weigh-in) Random assignment to 1/4 goal setting groups: ▪ *No Goal* (N) – monitor daily caloric intake ▪ *Low Goal* (L) – monitor daily caloric intake and reduce individualized daily level by 500 calories ▪ *Medium Goal* (M) – monitor daily caloric intake and reduce individualized daily level by 750 calories ▪ *High Goal (*H) – monitor daily caloric intake and reduce individualized daily level by 1000 calories	▪ Individuals who met or exceeded the prescribed caloric goal level (%): L (85); M (54); H (42); the low and high goal groups differed significantly ▪ Caloric intake self-monitoring plus goal setting produced greater weight loss than self-monitoring alone ▪ Various goal levels did not impact weight loss differentially over 4 weeks
Baron & Watters (1982)	A desire to lose 15lb *n* = 60 (47 female, 13 male); M age = 24 4-week intervention	To investigate the usefulness of restraint as a unit of self-monitoring for weight loss and to examine the effect of setting different goal levels on the self-monitoring process	Subjects given daily self-monitoring cards (handed in weekly) A restraint = not carrying out an intention to eat or reducing the amount of food eaten Subjects assigned randomly to 1/4 goal setting restraint groups: ▪ *No Restraint Goal* (N) – monitor daily restraints ▪ *Low Restraint Goal* (L) – monitor daily restraints and asked to exercise 4 restraints per day ▪ *Medium Restraint Goal* (M) – monitor daily restraints and asked to exercise 7 restraints per day ▪ *High Restraint Goal (*H) – monitor daily restraints and asked to exercise 10 restraints per day	▪ Weight decreased significantly for all groups between weeks 1 and 4 ▪ Individuals who met or exceeded their prescribed restraint goal (%): L (64); M (31); H (10); the low and high goal groups differed significantly ▪ Restraint was not an effective self-monitoring unit ▪ Self-monitoring with a goal was not more effective than self-monitoring alone ▪ Various goal levels did not impact weight loss differentially over 4 weeks

Ureda (1980)	Participants selected from a behavioural weight control project for self-referred clients *n* = 106 (98 female, 8 male); median weight = 170.5lb; M age = 33.3; 4-week program Follow-up interviews 10-15 weeks post program	To investigate the impact of commitment on achievement of diet and exercise related behaviour-change goals as a function of behavioural contracts	4-week educational phase with psychological, physiological, and nutrition information; behaviour modification techniques; homework 3 behaviour intention contracts created regarding program participation, nutrition workbook completion, and establishing a weight-controlling routine Random assignment to 1/2 treatments: ▪ *Treatment* (T) – Take-home contracts signed by the participant and at least one friend, relative, or peer ▪ *Control* (C) – Take-home contracts signed by participant only	▪ Motivation scores showed significant correlations between intentions to perform weight control behaviours and weight loss ▪ T group had significantly stronger intentions ▪ T group lost weight at a significantly faster rate than C group ▪ Enhancement of commitment through contract witnessing was significant
VanWormer (2004)	Self-referral *n* = 3 (2 female, 1 male); M weight = 186.3; M age = 44 7 week treatment with a 6-month follow-up	To examine the impact of pedometer-aided self-monitoring and e-counseling on physical activity and weight in overweight adults	Subjects given pedometer, shown how to use it, instructed to wear all day, and record steps before bed Weight recorded weekly by participants Participants engaged in 3 study phases: ▪ *Baseline* – wore blinded pedometers for one week ▪ *Self-monitoring* – wore pedometers unblinded and self-monitored steps ▪ *Self-monitoring plus e-counseling* – reviewed steps/set goals/received praise via e-mail once per week	▪ All participants increased their steps during treatment phases ▪ Functional relationship between self-monitoring and physical activity observed ▪ Amount of weight lost was associated with improvement in physical activity
Wing & Epstein (1981)	Individuals wishing to participate in a behavioural weight loss program *n* = 36 (28 female, 8 male); M weight = 207.5; M age = 40 10-week program with 4-month follow-up	To examine the effect of prescribing 3 different caloric deficit goals on adherence to the prescription and weight loss	Random assignment to 1/3 groups: ▪ *Small restriction* (S) – reduce daily intake by 200 calories/week up to 1000 calories over 5 weeks and maintain for 5 weeks ▪ *Moderate restriction* (M) – reduce daily caloric intake by 1000 immediately and maintain for 10 weeks ▪ *Large restriction* (L) – reduce daily caloric intake by 1500 for 3 weeks, gradually decrease to 1000/day deficit for 2 weeks and maintain for 5 weeks Goal sheets used to monitor weekly caloric intake Subjects were phoned 3 times/week for first 4 weeks of program to determine progress	▪ Significant weight losses occurred for all groups over time ▪ 3 treatment conditions produced no difference in weight loss between groups ▪ Compliance to intake instructions highest in M group ▪ All groups reduced intake more than prescribed; the greatest difference between actual/prescribed found in the S group ▪ Weight loss during weeks 1-5 predicted weight loss during latter weeks

Booth et al. (2008)	BMI between 24.5 and 37 kg/m^2 *n* = 73; 53 completed the study (21% male); M BMI = 29.7; M weight = 82.4 kg; M age = 46.3 12-week program	To compare the effects of an Internet-based weight loss program as a function of exercise plus dietary advice versus exercise alone on weight loss and positive lifestyle changes	All participants provided with pedometer at baseline Random assignment to 1/2 groups: ▪ *Exercise advice* (EX) – Recorded daily steps and entered into program weekly. Program evaluated results and sent participant step goals for the following week. Participant allowed to personalize assigned goals ▪ *Dietary advice* (ED) – Same procedure as EX group Participants were given information on healthy eating and set weekly dietary goals. Physical activity and dietary goal modification and support were provided	▪ The EX group lost twice as much weight as ED group; results were not significant ▪ Significant decreases in BMI and waist circumference occurred for both groups ▪ Daily steps increased significantly between weeks 1-12; no difference between groups ▪ No correlation between number of dietary goals set and weight loss ▪ Goal setting for increasing exercise appears to be more effective than goal setting for dietary change in the short term
Donaldson & Normand (2009)	BMI $\geq$ 25 kg/m^2 *n* = 5 (2 female, 3 male); M weight = 215.5; M BMI = 32.9; M age = 50 14-week program	To evaluate the effect of goal setting, self-monitoring, and individualized feedback on caloric expenditure in overweight and obese adults	Program consisted of classes on healthy eating, the benefits of exercise, and role of calories Participants provided with heart rate monitors to measure daily calorie expenditure and heart rate Daily calorie expenditure goals set at baseline (10% above average daily expenditure) Goals adjusted by participant weekly or held constant based on performance the previous week Participants sent daily progress to researcher via e-mail for feedback Weekly meetings held to review progress and provide encouragement	▪ All participants increased caloric expenditure during intervention ▪ Degree of change varied by participant considerably ▪ 4/5 participants lost weight and decreased their BMI ▪ Impact of experimenter feedback on expenditure levels varied by participant (i.e., one increased without feedback; one decreased without feedback) ▪ Calories consumed not monitored
Schneider et al. (2006)	BMI $\geq$ 25 – 45 kg/m^2 *n* = 56 (37 female, 19 male) 36-week program	To examine the effects of a 10,000 step/day exercise program on sedentary overweight and obese adults in relation to adherence, body composition and cardiovascular risk factors	Participants given an activity log and pedometer to wear every day during waking hours Dietary records completed at baseline, 20, and 36 weeks Progressive physical activity prescription provided to participants (7000 steps/day week 1; 8000 steps/day week 2; 9000 steps/day week 3; 10000 steps/day for remainder) Meetings held every 2 weeks for 2 months and then monthly to inquire into progress, answer questions, and provide educational information on exercise Log-sheets handed in biweekly	▪ Analysis on adherers showed significant improvements in multiple variables (e.g. steps/day, body weight, BMI, % fat, waist circumference) ▪ Adherers and non-adherers increased daily walking significantly ▪ Non adherers cited lack of time (88%), bad weather (6%), and goals too high (6%) as reasons for not meeting prescribed goals ▪ No significant differences found for total energy intake across 36 weeks ▪ Adherence to 10000 step/day goal impacts weight loss magnitude

Taylor et al. (1991)	Female subjects with a BMI between 25 and 35kg/m^2 *n* = 57; M weight = 76.7; M age = 43.7 12 week treatment with a 6-month follow-up	To investigate factors that could elicit greater weight loss using computer-assisted therapy	Hand-held computer provided to each participant and programmed with an exercise program All subjects participated in 4, 1.5 hour group sessions Random assignment to 1/2 treatment groups: ▪ *Computer Assisted Therapy (CAT)* – food consumed, minutes of exercise, and weight were entered in the computer daily/weekly; subjects were encouraged to enter a 10-week target weight loss goal/calorie limit The computer provided reinforcement; encouraged goals and use of the weight loss program provided (1200 calories per day based on frozen food entrees) ▪ *Frozen Food First* (FFF) – computers for exercise data entry only; subjects instructed to use the prescribed weight loss program until 8-10lbs were lost or until week 5; proceeded in same manner as CAT after that point	▪ FFF group lost significantly more weight than CAT group from pre-post treatment (M = 5.3 vs 3.1kg) and pre-treatment to the 6-month follow-up (M = 3.8 vs 0.9kg) ▪ FFF group reported significantly more exercise than CAT at follow-up ▪ A CAT program preceded by 4 weeks of a 1200 calorie frozen food diet can significantly increase weight loss in individuals using computers for self-monitoring, goal setting, and feedback
VanWormer et al. (2009)	BMI $\geq$ 32kg/m^2 *n* = 100 (91 female, 9 male); M weight = 232.8; M BMI = 35.2; 6-month intervention with 6, 12 and 18-month follow-ups	To examine the effects of a weight loss intervention combining telephone based counseling with daily weighing on weight loss	Random allocation to immediate (I) or delayed start (D) groups Program manual provided detailed information on nutrition, physical activity, stress management, etc. Food/activity logbook, weekly weight chart, action planner, home scale and telemonitoring device, and pedometer provided to all participants Up to 10 bi-weekly,15-minute coaching calls delivered to each participant Each conversation involved review of weight change and goal progress, goal setting for future weeks, supportive feedback, and problem solving Scale and device provided reminders and daily prompts to assess goal attainment	▪ Significant effects for time and group by time were found for weight loss at the 6-month follow-up visit; the intervention was superior to no contact for promoting weight loss ▪ Weight loss magnitude greater for I than D ▪ Combining telephone-based counseling, with a telemonitoring home-scale is effective for promoting short-term weight loss in obese individuals
Sperduto et al. (1986)	Unclear *n* = 173 (130 female, 43 male)	To examine the effects of monitoring and charting eating and exercise	Treatment = 15 weekly meetings in a group format; all participants provided with a manual ▪ *Forms Plus Manual* (F) – Target behaviour monitoring forms given to track 9 eating and activity behaviours daily from manual checklist; received weekly	▪ F subjects lost significantly more weight than M subjects at the end of treatment (15.9lb vs 6.2lb) ▪ The difference was maintained at 3 months

	15 week program; follow-up calls 3 months post treatment	behaviours on program adherence and weight loss	feedback and praise from therapist and set goals for next week ▪ *Manual Only* (M) – same as F group; did not monitor behaviours	▪ F group completion rate was significantly higher than M group (74.4% vs 56.8%) ▪ The addition of self-monitoring and charting of eating behaviours to an obesity program can increase treatment efficacy
Zegman & Baker (1983)	Not identified *n* = 43; M weight = 180lb; M % overweight = 37; M age = 44 4-week treatment with 3, 6, and 12-month follow-ups	To compare proximal and distal goal setting on degrees of caloric consumption	Females assigned 1200 calorie limit per day; males assigned 1500 Subjects asked to record food consumption quantities immediately after intake Random assignment to 1/2 goal setting groups: ▪ *Proximal* (P) – Asked to reference calories immediately following consumption and distribute daily caloric allotment across meals/snacks ▪ *Distal* (D) – Asked to delay calorie referencing and totaling until the last food item of the day consumed	▪ D group reported greater reductions in weight and caloric consumption during treatment ▪ No significant weight loss differences between groups during treatment or maintenance ▪ Greater deprivation and attrition in D goal group ▪ All subjects consumed progressively fewer calories than prescribed during treatment

Table 2. START evaluation criteria: Goal setting intervention components for selected studies

Authors	Specificity	Timing	Acquisition	Rewards and feedback	Tools
Bandura & Simon (1977)	Specific	Proximal and distal	Assigned	Yes Unclear	Education component Self-control strategy manual Wrist-counter for measuring intake Self-monitoring
Burnett et al. (1985)	Specific	Proximal	Collaborative and self-determined	No Yes	Portable lap-sized computer Self-monitoring
Chapman & Jeffrey (1978)	Specific	Proximal and distal	Self-determined	Yes Yes	Education component Self-monitoring Behavioural contracts
Jarvie &Thompson (1985)	General and specific	Proximal	Self-determined and assigned	No No	Educational component Self-monitoring Instructional exercise booklet Activity diary
Dubbert & Wilson (1984)	Specific	Proximal and distal	Self-determined and assigned	Yes Yes	Education component Self-monitoring Spousal support Behavioural contracts
Jeffery et al. (2003)	Specific	Proximal	Assigned	Yes Yes	Education component Self-monitoring
Baron & Watters (1981)	Specific	Proximal	Assigned	Yes No	Education component Self-monitoring Calorie-counting booklet
Baron & Watters (1982)	Specific	Proximal	Assigned	Yes No	Education component Self-monitoring
Ureda (1980)	Unclear	Unclear	Self-determined	No No	Educational component Behavioural contracts Homework Family/peer support
VanWormer (2004)	Unclear	Unclear	Unclear	No Yes	Self-monitoring Pedometer

Authors	Specificity	Timing	Acquisition	Rewards and feedback	Tools
Wing & Epstein (1981)	Specific	Proximal	Assigned	Yes Yes	Education component Self-monitoring Eating/exercise diaries Social support
Booth et al. (2008)	Specific	Proximal and distal	Assigned and self-determined	No Yes	Education component Pedometer Self-monitoring Internet-based program
Donaldson & Normand (2009)	Specific	Proximal and distal	Assigned and self-determined	No Yes	Education component Heart rate monitor Self-monitoring
Schneider et al. (2006)	Specific	Proximal and distal	Assigned	No Yes	Self-monitoring Pedometer Activity log
Taylor et al. (1991)	Specific	Proximal and distal	Self-determined and assigned	Yes Yes	Portable hand-held computer Self-monitoring Social support
VanWormer et al. (2009)	Specific and general	Proximal and distal	Unclear	No Yes	Education component Self-monitoring Pedometer Logbooks, chart, and planner Home scale with monitoring device
Sperduto et al. (1986)	Specific	Proximal and distal	Assigned	Yes Yes	Education component Self-monitoring Nutrition manual
Zegman & Baker (1983)	Specific	Proximal and distal	Assigned & self-determined	Yes No	Self-monitoring

Results

Study Details

The participants involved in the selected studies were included based on varying sets of overweight and/or obesity criteria. Researchers recruited individuals who: fell above what was considered a relative ideal, or normative weight percentage (Bandura & Simon, 1977; Burnett, Taylor, & Agras, 1985; Chapman & Jeffrey, 1978; Jarvie & Thompson, 1985); were overweight as identified in pounds or kilograms (Dubbert & Wilson, 1984; Jeffery, Wing, Sherwood, & Tate, 2003); desired to lose 15 pounds (Baron & Watters, 1981, 1982); wanted to join a weight loss program (Ureda, 1980; Wing & Epstein, 1981; VanWormer, 2004); or fell above a particular BMI (Booth, Nowson, & Matters, 2008; Donaldson & Normand, 2009; Schneider, Bassett, Thompson, Pronk, & Bielak, 2006; Taylor, Agras, Losch, Plante, & Burnett, 1991; VanWormer et al., 2009). Specific participant eligibility criteria were unclear in 2 studies (Sperduto, Thompson, & O'Brien, 1986; Zegman & Baker, 1983). The average age of participants ranged from 24 to 50 years old and the majority of the study populations overwhelmingly were female. Mean percent overweight and BMI values were between 15 to 50 %, and 29.7 to 35.2 kg/m^2 respectively.

Studies examined the effects of goal setting on dietary behaviours (Bandura & Simon, 1977; Baron & Watters, 1981, 1982; Chapman & Jeffrey, 1978; Wing & Epstein, 1981; Zegman & Baker, 1983), physical activity behaviours (Donaldson & Normand, 2009; Jarvie & Thompson, 1985; Schneider et al., 2006; VanWormer, 2004), or a combination of the two (Booth et al., 2008; Burnett et al., 1985; Dubbert & Wilson, 1984; Jeffery et al., 2003; Sperduto et al., 1986; Taylor et al., 1991; Ureda, 1980; VanWormer

et al., 2009). Intervention length within the studies occurred mostly between 4 and 8 weeks (Bandura & Simon, 1977; Baron & Watters, 1981, 1982; Burnett et al., 1985; Chapman & Jeffrey, 1978; Ureda, 1980; VanWormer, 2004; Zegman & Baker, 1983); or 10 to 19 weeks (Booth et al., 2008; Donaldson & Normand, 2009; Dubbert & Wilson, 1984; Jarvie & Thompson, 1985; Sperduto et al., 1986; Taylor et al., 1991; Wing & Epstein, 1981). The length in three studies extended over the course of 6, 9, and 18 months (Jeffery et al., 2003; Schneider et al., 2006; VanWormer et al., 2009). Follow-up assessments occurred at differing intervals amongst the studies and ranged from eight weeks to 30 months post-intervention. In order to analyze the structural components of the selected goal setting studies, the START Evaluation Criteria were applied (Table 2).

START Evaluation Criteria

Specificity. Sixteen of the 18 studies employed specific goals as part of their behaviour change protocols (e.g., restrict daily caloric intake by 750 calories; walk 7000 steps per day for one week); two of these 16 interventions also combined goals of a more general nature such as 'reduce caloric intake' (Jarvie & Thompson, 1985; VanWormer et al., 2009). The content of the goals set within two of the eighteen studies was not clear (Ureda, 1980; VanWormer, 2004). Significant behavioural and physiological changes (e.g., decreased food consumption, weight loss) were found in two studies that compared the impact of explicitly defined goal setting conditions with general or no goal treatment groups (Bandura & Simon, 1977; Chapman & Jeffrey, 1978).

Timing. With the exception of the two studies where goal content was not specified, 16 studies endorsed the use of proximal or daily goals either in isolation (Baron & Watters, 1981, 1982; Burnett et al., 1985; Jarvie & Thompson, 1985; Jeffery et al.,

2003; Wing & Epstein, 1981), or in combination with distal or weekly goal setting (Bandura & Simon, 1977; Booth et al., 2008; Chapman & Jeffrey, 1978; Donaldson & Normand, 2009; Dubbert & Wilson, 1984; Schneider et al., 2006; Sperduto et al., 1986; Taylor et al., 1991; VanWormer et al., 2009; Zegman & Baker, 1983). Three studies within the selected review (Bandura & Simon, 1977; Dubbert & Wilson, 1984; Zegman & Baker, 1983) examined the effects of goal proximity specifically on dietary and exercise behaviours as well as weight loss. When comparisons were made to distal or no goal groups, findings revealed some favourable outcomes for proximal goal setting as evidenced by changes in eating behaviours and weight loss (Bandura & Simon, 1977). Alternatively, Zegman and Baker (1983) found greater reductions in caloric consumption in the distal goal setting group during treatment; however, attrition rates in this same group were also higher compared with the proximal group.

Acquisition. Thirteen studies within this review incorporated assigned goals (Bandura & Simon, 1977; Baron & Watters, 1981, 1982; Sperduto et al., 1986; Jeffery et al., 2003; Schneider et al., 2006; Wing & Epstein, 1981), or goals that were both assigned and self-determined (Booth et al., 2008; Donaldson & Normand, 2009; Dubbert & Wilson, 1984; Jarvie & Thompson, 1985; Taylor et al., 1991; Zegman & Baker, 1983). Assigned goals included variations of reducing caloric intake and increasing expenditure, as well as prescriptions pertaining to progressive increases in exercise frequency, intensity, and duration. Two studies endorsed self-determined goals exclusively (Chapman & Jeffrey, 1978; Ureda, 1980), while one study utilized collaborative goal setting in conjunction with self-determined goals (Burnett et al., 1985). Acquisition of

goals was unclear in two studies (VanWormer, 2004; VanWormer et al., 2009). No studies assessed the impact of acquisition on outcome variables independently.

Rewards and feedback. The inclusion of rewards was not observed frequently in these community-based goal setting interventions for overweight and obesity treatment. Several researchers did refund subjects incrementally for monetary deposits they made previously to increase commitment to the program; however, the impact of this incentive technique was not discussed within the studies relative to goal attainment (Bandura & Simon, 1977; Baron & Watters, 1981, 1982; Dubbert & Wilson, 1984; Sperduto et al., 1986; Taylor et al., 1991; Wing & Epstein, 1981; Zegman & Baker, 1983). Only two of the eighteen studies purposefully examined the impact of reward provision on behavioural outcomes (Chapman & Jeffrey, 1978; Jeffery et al., 2003). In these particular interventions, rewards consisted of verbal (e.g., receiving praise from others), material (e.g., special outings), and monetary remuneration (e.g., being paid small incentives for achieving or exceeding goals). Chapman and Jeffrey (1978) found that conditions involving self-rewards did not produce significant differential weight loss compared with non-reward treatment groups. In fact, participants in this particular study identified self-rewarding and being rewarded by others as two of the least helpful behaviour change techniques learned out of a possible 19. The impact of monetary incentives on goal attainment could not be distinguished in the second study given that several other components were also included as part of the intervention (Jeffery et al., 2003).

Twelve of the 18 studies incorporated a feedback component which was delivered in person, over the telephone, or technologically via e-mail or through a computer program (Booth et al., 2008; Burnett et al., 1985; Chapman & Jeffrey, 1978; Donaldson

& Normand, 2009; Dubbert & Wilson, 1984; Jeffery et al., 2003; Schneider et al., 2006; Sperduto et al., 1986; Taylor et al., 1991; VanWormer, 2004; VanWormer et al., 2009; Wing & Epstein, 1981). Types of feedback included: reviewing goals and making modifications as required; computer printouts and graphs detailing goal progression; problem solving discussions concerning difficulties with goal attainment; encouragement to set more challenging goals; praise, support, and reinforcing messages for achieving goals; and the provision of relevant education information. Five studies did not incorporate a feedback component (Baron & Watters, 1981, 1982; Jarvie & Thompson, 1985; Ureda, 1980; Zegman & Baker, 1983), and the inclusion of this criterion was unclear in one study (Bandura & Simon, 1977). In general, feedback on progress was incorporated as a component within the larger intervention and was not assessed independently in any of the studies with respect to behavioural outcomes.

Tools. Several tools were incorporated into the interventions and used as mechanisms to facilitate the behaviour change process. For the purposes of this review, these components were grouped into three categories (described below): (1) Education; (2) Self-monitoring; and (3) Assistive devices. Participant education was a salient feature in 13 of the 18 studies and was delivered either as part of a baseline period or the formal intervention (Bandura & Simon, 1977; Baron & Watters, 1981, 1982; Booth et al., 2008; Chapman & Jeffrey, 1978; Donaldson & Normand, 2009; Dubbert & Wilson, 1984; Jarvie & Thompson, 1985; Jeffery et al., 2003; Sperduto et al., 1986; VanWormer et al., 2009; Ureda, 1980; Wing & Epstein, 1981). Information was provided on topics such as: nutrition and physical activity; caloric intake and expenditure; stimulus and self-control

techniques; problem-solving, self-monitoring and goal setting instructions; social support; self-reinforcement and motivation; and relapse prevention.

Self-monitoring is a process whereby an individual observes and manually monitors his or her own behaviour, and then evaluates the outcomes through comparisons to performance standards or goals (Baron & Watters, 1981). Through the application of self-monitoring techniques, participants can self-reinforce, modify, and set realistic goals (Sperduto et al., 1986). This process was featured in 17 of the 18 studies. Homework assignments and contracts were utilized in one study (Ureda, 1980); however, the use of explicit self-monitoring techniques as defined by Baron and Watters (1981) as part of this process was unclear.

In an effort to facilitate the self-monitoring process and bring the attainment of behavioural goals to fruition; multiple assistive devices were integrated into the interventions. These included items such as calorie-counting booklets, exercise and nutritional manuals and diaries, self-monitoring cards, mouthful counters, pedometers, heart-rate monitors, home scales, social support, behavioural contracts, portable computers, and internet-based programs.

Discussion

Given the increasing prevalence of societal overweight and obesity, a focus on behavioural interventions aimed at reducing these trends is paramount. The purpose of the present paper was to examine goal setting as a behaviour change strategy, specific to diet and physical activity, within community-based studies targeting overweight and obese adults. Through applying the START Evaluation Criteria, an analytical exploration of the components incorporated within these types of interventions was

undertaken with a view towards providing evidentiary support for goal setting as a useful strategy for weight loss and behaviour modification in this particular population.

With the exception of two studies, all authors incorporated the setting of explicit goals. In accordance with strategies employed in clinical settings (Bodenheimer & Handley, 2009), it is clear that specifically set goals are an important facet of community-based behaviour change interventions for overweight and obesity. Shilts and colleagues (2004) noted that setting specific goals enables individuals to organize behavioural aspirations, acquired information, and skills into practical and manageable steps. Through setting unambiguous goals, individuals are afforded the opportunity to make adjustments in other behavioural domains which may facilitate overall goal attainment. For example, setting a personal goal to engage in 45 minutes of moderate intensity cardiovascular exercise at the gym on the way home from work can be achieved through careful time management and scheduling. Dietary consumption can also be planned for in advance to allow for adequate energy reserves. Alternatively, a 'do your best goal' (Locke & Latham, 2002) to exercise on that same day is less likely to be attained given the absence of measurable properties and subsequent ability to determine outcomes. Moreover, failure to achieve a 'do your best goal' could also have a negative impact on self-efficacy which has been shown to have a cyclical effect on goal setting (Locke & Latham, 2002). That is, individuals who fail to achieve their goals can acquire low self-efficacy which, in turn, can impact their ability to perform or set future goals. However, when goals are set specifically, achievement can be measured thus enhancing the likelihood of attainment and the potential for increases in self-efficacy. As a result, goals

can be set higher or made more challenging, which, according to goal setting theory, leads to significantly higher performance (Locke & Latham, 2002).

With respect to timing, proximal goal setting was endorsed extensively within these particular studies; this substantiates previous findings regarding the value of setting short-term goals in health-related contexts (Bodenheimer & Handley, 2009). In addition, several of the interventions incorporated both proximal and distal goals, which is indicative of the importance of delineating small steps with a view towards achieving a larger, distal goal (Strecher et al., 1995). For overweight and obese individuals wanting or needing to lose a significant amount of weight, the prospect of doing so can be overwhelming. Through deconstructing the pending process and creating sub-goals, modifications can be made, and incremental achievements can be observed and celebrated, thereby enhancing the likelihood of continued perseverance (Strecher et al., 1995).

For goal acquisition, the studies primarily involved goals that were assigned by the researcher(s), or a combination of goals that were both assigned and self-determined at varying time points within the intervention. Few collaborative efforts were distinguishable. Drawing generalizable conclusions as to the superior method for developing a goal in this context is challenging, given that none of the studies measured acquisition as a dependent variable. However, there is a growing body of evidence in the health behaviour change and obesity field that endorses the use of collaborative goal setting as a means to elicit positive health outcomes such as weight loss (Newnham-Kanas, Irwin, Morrow, 2008; van Zandvoort, Irwin, & Morrow, 2009). Co-Active life coaching, a behaviour change method with its roots in Motivational Interviewing (Miller

& Rollnick, 2002; Newnham-Kanas, Morrow, & Irwin, 2010), utilizes a collaborative partnership whereby the coach assists the client in goal development iteratively, based on that particular client's plans, intentions, and values (Whitworth, Kimsey-House, Kimsey-House, & Sandahl, 2007). Although these initial studies have proven efficacious in improving health outcomes, additional research is needed to solidify collaborative goal acquisition as a superior strategy in this particular population.

Based on the present results, the inclusion of a reward component does not appear to be a necessary condition of community-based interventions that target overweight and obesity through goal setting. Given the assumption that the individuals involved within these programs are doing so volitionally and therefore desire behavioural reformation, rewards and incentives do not seem warranted to induce participation. Feedback, on the other hand, does appear to be an essential characteristic which is a worthy consideration in this population. Aside from the physical health sequelae associated with overweight and obesity, numerous psychological manifestations can also accompany these conditions. In particular, low self-esteem has been correlated with excess adiposity which can, in turn, have implications on motivation and commitment towards attempting weight loss (Ciliska, 1998; Shaw, O'Rourke, Del Mar, & Kenardy, 2007). Through the provision of goal-related feedback from an external source, individuals can focus on multiple aspects of their progression (e.g., behavioural changes; body composition measures such as waist circumference) and use the information to build on successes and alter plans accordingly. This external feedback, if provided in a supportive and encouraging manner, could also prove essential towards increasing overall motivation and self-esteem, while simultaneously instilling the necessary skills for individuals to

serve eventually as their own source of feedback. From a health promotion perspective, this type of empowerment and skill building is vital for enhancing an individual's ability to control his or her own health (WHO, 1986). Thus, the provision of feedback in relation to setting goals for overweight and obese individuals could play a significant role in increasing self-esteem, self-efficacy, and the ability to self-regulate health behaviours; however, more research is warranted to determine the independent contribution of this variable to explicit outcomes.

Several tools were incorporated into the reviewed studies. Specifically, educational sessions were implemented widely and served to: inform participants of expectations pertaining to study involvement; provide a rationale for which to take part; enable participants to gain health-related and/or self knowledge; engage participants in supportive group discussions, problem solving techniques, and skill building; and provide a preparatory stage for the behaviour change process. Based on the review results, it is clear that self-monitoring of physical activity and nutrition-related behaviours when targeting overweight and obesity is an important consideration. Overall, the inclusion of self-monitoring was a readily apparent feature in this body of literature as indicated by the various diaries, logbooks, and technological devices (e.g., pedometers, heart rate monitors, computers) that were provided to participants. The use of these tools in this context is congruent with recommendations made by The Ottawa Charter for Health Promotion (WHO, 1986) which endorsed the provision of health information, education, and enhancement of life skills. Through these tools, individuals can become more empowered and thereby enabled to cope with varying situations and make better informed health-related choices. Thus, the inclusion of educational sessions and self-

monitoring components should be considered when developing and implementing community-based goal setting interventions for overweight and obesity.

Conclusion

Positive behavioural and physiological results were observed across the selected studies including decreases in weight, BMI levels, and food and beverage consumption, as well as increased energy expenditure, and greater intentions to perform healthy behaviours. Based on this literature, it is clear that interventions focusing on goal setting are, in part, useful for effecting nutrition and physical activity related behaviour change among overweight and obese individuals participating in community-based research. However, the studies reviewed did not examine the effectiveness of the various START evaluative elements in isolation. As several different components were implemented concurrently (e.g., education sessions, personalized feedback, self-monitoring devices), over various lengths of time, and not assessed specifically to determine effectiveness on outcomes, it is not possible to ascertain which were responsible for the positive behavioural and physiological changes observed. Thus, causal inferences and recommendations pertaining to the optimal combination of goal setting components cannot be made with certainty. Given that previous goal setting research has not operationally streamlined this health behaviour change process, additional research is warranted in both community-based and primary care settings to integrate the START formula and elucidate further the specific mechanisms through which individuals with overweight or obesity can apply these criteria for the purposes of weight loss. Gaining greater insight into the behaviour change process through the application of tools such as goal setting may prove efficacious in ameliorating the escalating obesity epidemic.

Practice Implications

Although a relatively new health behaviour change method, goal setting shows promise as a useful, cost-effective, and empowering tool that can be incorporated easily into community-based weight reduction programs by health care professionals, researchers, and wellness specialists. As a result of applying the START evaluation criteria, it was determined that developing specific goals that are in close proximity with a desired distal outcome, involve the participant in acquisition, and incorporate regular feedback, are common features in this context and could contribute, in part, to eliciting positive health behaviour change. Educating participants and including a self-monitoring component also appear to be important considerations when addressing overweight and obesity behaviours and developing treatment plans aimed at this particular population.

The next two chapters build on this review by addressing START criteria elements differentially across an interactive versus prescriptive obesity treatment. While the MI-via-CALC approach integrates collaborative goal setting and regular feedback through interactive dialogue, the LEARN approach focusses more on educating patients and fostering goal setting through the development of self-monitoring practices. The latter is accomplished through the provision of didactic information, cognitive strategies, and tools. In service of attenuating physiological and psychological co-morbidities associated with excess weight, the two treatments were compared and discussed. The next article focused specifically on the impact of MI-via-CALC compared with the LEARN Program on the quality of life and self-esteem of university students with obesity during a 12-week intervention, and three- and six-months following its completion. Because weight-loss is a salient outcome measure in this population, a subsidiary aim

was to explore whether changes to these dimensions were related to changes in weight between baseline and the six-month follow-up assessment.

References

Balkau, B., Bassand, J., Barter, P., & Wittchen, H. (2007). International day for the evaluation of abdominal obesity (IDEA): A study of waist circumference, cardiovascular disease, and diabetes mellitus in 168 000 primary care patients in 63 countries. *Circulation, 116*(17), 1942-1951.

Bandura, A., & Simon, K. P. (1977). The role of proximal intentions in self-regulation of refractory behavior. *Cognitive Therapy and Research, 1*(3), 177-193.

Baron, P., & Watters, R. G. (1981). Effects of goal-setting and of goal levels on weight loss induced by self-monitoring of caloric intake. *Canadian Journal of Behavioural Science, 13*(2), 161-170.

Baron, P. & Watters, R. G. (1982). Effects of goal-setting and of goal levels on weight loss induced by self-monitoring. *International Review of Applied Psychology, 31,* 369-382.

Bodenheimer, T., & Handley, M. A. (2009). Goal-setting for behaviour change in primary care: An exploration and status report. *Patient Education and Counse*ling, *76*, 174-180.

Booth, A. O., Nowson, C. A., & Matters, H. (2008). Evaluation of an interactive, Internet-based weight loss program: a pilot study. *Health Education Research, 23*(3), 371-381.

Brown, V. A., Bartholomew, L. K., & Naik, A. D. (2007). Management of chronic hypertension in older men: an exploration of patient-goal setting. *Patient Education and Counseling, 69,* 93-99.

Burnett, K. F., Taylor, C. B., & Agras, W. S. (1985). Ambulatory computer-assisted therapy for obesity: A new frontier for behavior therapy. *Journal of Consulting and Clinical Psychology, 33*(5), 698-703.

Chapman, S. L., & Jeffrey, D. B. (1978). Situational management, standard setting, and self-reward in a behavior modification weight loss program. *Journal of Consulting and Clinical Psychology, 46*(6), 1588-1589.

Ciliska, D. (1998). Evaluation of Two Nondieting Interventions for Obese Women. *Western Journal of Nursing Research, 20*(1), 119-135.

Cullen, K. W., Baronowski, T., & Smith, S. P. (2001). Using goal setting as a strategy for dietary behaviour change. *Journal of the American Dietetic Association, 101,* 562-566.

DeWalt, D. A., Davis, T. C., Wallace, A. S., Seligman, H. K., Bryant-Shilliday, B., Arnold, C. L. … & Schillinger, D. (2009). Goal setting in diabetes self-management: Taking the baby steps to success. *Patient Education and Counseling, 77,* 218-223.

Donaldson, J. M., & Normand, M. P. (2009). Using goal setting, self-monitoring, and feedback to increase calorie expenditure in obese adults. *Behavioural Interventions, 24,* 73-83.

Doran, G. T. (1981). There's a S.M.A.R.T. way to write management's goals and objectives. *Management Review, 70*(11), 35-36.

Dubbert, P. M., & Wilson, G. T. (1984). Goal-setting and spouse involvement in the treatment of obesity. *Behaviour Research and Therapy, 21*(3), 221-242.

Economos, C. D., & Irish-Hauser, S. (2007). Community interventions: A brief overview and their application to the obesity epidemic. *The Journal of Law, Medicine, & Ethics*, *35*(1) 131-137.

Estabrooks, P. A., Nelson, C. C., Xu, S., King, D., Bayliss, E. A., Gaglio, B., ... Glasgow, R. E. (2005). The frequency and behavioural outcomes of goal choices in the self-management of diabetes. *The Diabetes Educator*, *31*(3), 391-400.

Foster, G. D., Makris, A. P., & Bailer, B. A. (2005). Behavioral treatment of obesity. *American Journal of Clinical Nutrition*, *82*, 230-235.

Greaney, M. L., Less, F. D., White. A. A., Dayton, S. F., Riebe, D., Blissmer, B., … Greene, G. W. (2009). College students' barriers and enablers for healthful weight management: A qualitative study. *Journal of Nutrition Education and Behavior*, *41*(4), 281-286.

Health Canada (2003). *Canadian guidelines for body weight classification in adults.* Retrieved from http://www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/nutrition/weight_book-livres_des_poids-eng.pdf

Hill, J.O., & Peters, J.C. (1998). *Environmental Contributions to the Obesity Epidemic.* Science, *280*, 1371-1374.

Irwin, J. D. & Morrow, L. D. (2005). Health promotion theory in practice: An analysis of Co-Active coaching. *International Journal of Evidence Based Coaching and Mentoring*, *3*(1), 29-38.

Jarvie, G. J., & Thompson, J. K. (1985). Appropriate use of stationary exercycles in the natural environment: The failure of instructions and goal setting to appriably modify exercise patterns. *The Behavior Therapist*, *8*, 187-188.

Jeffery, R. W., Wing, R. R., Sherwood, N. E., & Tate, D. F. (2003). Physical activity and weight loss: does prescribing higher physical activity goals improve outcomes? *American Journal of Clinical Nutrition, 78*, 684-689.

Katzmarzyk, P. T. (2002). The Canadian obesity epidemic, 1985-1998. *Canadian Medical Association Journal*, *166*(8), 1039-1040.

Kyllo, L. B., & Landers, D. M. (1995). Goal Setting in Sport and Exercise: A Research Synthesis to Resolve the Controversy. *Journal of Sport and Exercise Psychology, 17*, 117-137.

Lau, D. C. W., Douketis, J. D., Morrison, K. M., Hramiak, I. M., Sharma, A. M., & Ur, E. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. *Canadian Medical Association Journal, 176*(8), 1-13.

Lee, T. W., Locke, E. A., & Latham, G. P. (1989). Goal setting theory and job performance. In L. Pervin (Ed.), *Goal concepts in Personality and Social Psychology*. Hillsdale, NJ: Lawrence Erlbaum.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation. *American Psychologist*, *57*(9), 705-717.

Locke, E. A., & Latham, G. P. (2006). New directions in goal-setting theory. *Current Directions in Psychological Science, 15*, 265-268.

Luo, W., Morrison, H., deGroh, M., Waters, C., DesMeules, M., Jones-McLean, E., … & Mao, Y. (2007). The burden of adult obesity in Canada. *Chronic Diseases in Canada*, *27*(4), 135-144.

Miller, W. R., & Rollnick, S. (2002). *Motivational Interviewing: Preparing People for*

Change (2nd ed.). New York, NY: The Guildford Press.

Naik, A. D., Palmer, N., Petersen, N. J., Street, R. L. Jr., Rao, R., Suarez-Almazor, M., & Haidet, P. (2011). Comparative effectiveness of goal setting in diabetes mellitus group clinics: Randomized clinical trial. *Archives of Internal Medicine, 171*, 453-459.

Neubert, M. J. (1998). The value of feedback and goal setting over goal setting alone and potential moderators of this effect: A meta-analysis. *Human Performance, 11*(4), 321-335.

Newnham-Kanas C, Irwin J. D., & Morrow D. (2008). Life coaching as an intervention for individuals with obesity. *International Journal of Evidence-Based Coaching and Mentoring, 6*(2), 1-12.

Newnham-Kanas, C., Morrow, D., & Irwin, J. (2010). A Functional Juxtaposition of Three Methods for Health Behaviour Change: Motivational Interviewing, Coaching, and Skilled Helping. *International Journal of Evidence-Based Coaching and Mentoring, 8*, 27-48.

Papas, M. A., Albert, A. J., Ewing, R., Helzlsouer, K. J., Gary, T. L., & Klassen, A. C. (2007). The built environment and obesity. *Epidemiological Review*, 29, 129-143.

Pettman, T. L., Misan, G. M. H., Owen, K., Warren, K., Coates, A. M., Buckley, J. D., & Howe, P. R. C. (2008). Self-management for obesity and cardio-metabolic fitness: Description and evaluation of the lifestyle modification program of a randomised controlled trial. *International Journal of Behavioral Nutrition and Physical Activity, 5*(53), 1-15.

Public Health Agency of Canada (2011). *Obesity in Canada. A joint report from the*

Public Health Agency of Canada and the Canadian Institute for Health Information. Cat.: HP5-107/2011E-PDF

Roher, J. E., Naessens, J. M., Liesinger, J., Tulledge-Scheitel, S., & VanHouten, H. (2010). A telephonic coaching program has more impact when body mass index is over 35. *Obesity Research and Clinical Practice*, *4*, 65-72.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.

Schneider, P. L., Basset, D. R., Thompson, D. L., Pronk, N. P., & Bielak, K. M. (2006). Effects of a 10,000 steps per day goal in overweight adults. *The Science of Health Promotion*, *21*(2), 85-89.

Shaw, K., O'Rourke, P., Del Mar C., & Kenardy, J. (2005). Psychological Interventions for Overweight or Obesity (Review). *Cochrane Database of Systematic Reviews*. Issue 2. Art No.:CD003818. DOI 10.1002/14651858.CD003818.pub2.

Shilts, M. K., Horowitz, M., & Townsend, M. S. (2004). Goal setting as a strategy for dietary and physical activity behaviour change: a review of the literature. *American Journal of Health Promotion, 19*(2), 81-93.

Sperduto, W. A., Thompson, H. S., & O'Brien, R. M. (1986). The effect of target behavior monitoring on weight loss and completion rate in a behavior modification program for weight reduction. *Addictive Behaviors, 11*, 337-340.

Statistics Canada (2010). *Canadian Health Measures Survey: 2007-2009.* Retrieved from http://www.statcan.gc.ca/daily-quotidien/100113/dq100113a-eng.htm

Strecher, V. J., Seijts, G. H., Kok. G. J., Latham, G. P., Glasgow, R., DeVellis, B., ...

Bulger, D. W. (1995). Goal setting as a strategy for health behaviour change. *Health Education Quarterly, 22*(2), 190-200.

Taylor, C. B., Agras, W. S., Losch, M., Plante, T. G., & Burnett, K. (1991). Improving the effectiveness of computer-assisted weight loss. *Behavior Therapy*, 22, 229-236.

Ureda, J. R. (1980). The effect of contract witnessing on motivation and weight loss in a weight control program. *Health Education and Behavior*, *7*(3), 163-185.

VanWormer, J. J. (2004). Pedometers and brief e-counseling: Increasing physical activity for overweight adults. *Journal of Applied Behavior Analysis*, *37*, 421-425.

VanWormer, J. J., Martinez, A. M., Benson, G. A., Crain, A. L., Martinson, B. C., Cosentino, D. L., & Pronk, N. P. (2009). Telephone counseling and home telemonitoring: The weight by day trial. *American Journal of Health Behaviour*, *33*(4), 445-454.

van Zandvoort, M., Irwin, J. D., & Morrow, D. (2009). The Impact of Co-active Life Coaching on Female University Students with Obesity. *International Journal of Evidence Based Coaching and Mentoring*, *7*(1), 104-118.

Weinberg, R. S. (1994). Goal setting and performance in sport and exercise settings. *Medicine and Science in Sports and Exercise*, *26*(4), 469-477.

Whitworth, L., Kimsey-House, K., Kimsey-House, H., & Sandahl, P. (2007). *Co-Active Coaching: New skills for coaching people toward success in work and life*. California: Davies-Black Publishing.

WHO (1986). *First international conference on health promotion.* Ottawa, Canada.

Wilson, P. W. F., D'Agostino, R. B., Sullivan, L., Parise, H., & Kannel, W. B. (2002).

Overweight and obesity as determinants of cardiovascular risk: The Framingham experience. *Archives of Internal Medicine, 162,* 1867-1872.

Wing, R. R., & Epstein, L. H. (1981). Prescribed level of caloric restriction in behavioral weight loss programs. *Addictive Behaviors, 5*, 139-144.

Zegman, M. & Baker, B. (1983). The influence of proximal vs. distal goals on adherence to prescribed calories. *Addictive Behaviors, 8*, 319-322.

Article 3
The CHANGE Program: Comparing an Interactive versus Prescriptive Obesity Intervention on University Students' Self-Esteem and Quality of Life[3]

In 2008, the World Health Organization (WHO) estimated the presence of approximately 500 million adults with obesity worldwide (WHO, 2011). Mirroring this international trend, recent reports indicate that more than one in four Canadian adults are now classified as obese (i.e., Body Mass Index [BMI] $\geq$ 30kg/m^2; Public Health Agency of Canada [PHAC], 2011; Shields, Carroll, & Ogden, 2011). A prominent contributor to ill health and premature mortality, obesity is a modifiable risk factor for a myriad of conditions and diseases including type 2 diabetes, cardiovascular disease, stroke, hypertension, and some forms of cancer (e.g., Bray, 2004; Lau et al., 2007). The fundamental cause of obesity is over-nutrition and sedentariness which, in combination, create a long-term positive energy balance (Lau et al., 2007; WHO, 2011). Thus, common recommendations propose an energy-reduced diet and regular physical activity as the first line of treatment (e.g., Lau et al., 2007; Strychar, 2004). From a public health perspective, uncovering effective protocols for promoting positive and sustainable lifestyle changes is a paramount priority.

While obesity has been studied extensively with a view towards attenuating physical health concerns, the underlying psychosocial antecedents and consequences that can accompany this condition are complex and less understood (Hill & Williams, 1998; Tuthill, Slawik, O'Rahilly, & Finer, 2006; van der Merwe, 2007). In light of the fact that obesity appears to affect adversely the capacity of individuals to live full and active lives

[3] A version of this chapter has been submitted for publication.

(de Zwaan et al., 2009), quality of life (QoL) has been viewed increasingly as a salient outcome measure of obesity-related research (Duval, Marceau, Pérusse, & Lacasse, 2006; Kushner & Foster, 2000).

QoL refers to an individual's perception of his or her well-being and performance in one or more areas of: somatic sensation (e.g., pain); physical function (e.g., mobility, self-care); emotional state (e.g., anxiety); and social interaction (e.g., visiting friends; Jain, 2004; Kushner & Foster, 2000; Shipper, Clinch, & Powell, 1990). Individuals with obesity tend to experience a lower QoL than their non-obese counterparts with the level of impairment correlating directly with the severity of obesity (Fontaine, Cheskin, & Barofsky, 1996; Jain, 2004; Tuthill et al., 2006). A self-perceived decline in QoL has been identified as one of the primary reasons an individual will seek obesity treatment (Kushner & Foster, 2000). Therefore, gaining insights into the experience of obesity from a QoL perspective allows for an advanced understanding of and appreciation for the condition from the patient or participant's point of view with respect to his/her feelings, values, abilities, and expectations (Kushner & Foster, 2000). Moreover, obtaining QoL measurements from individuals who are struggling with their weight is a useful way to evaluate the effects of treatment, and ultimately could influence the development of service provision, healthcare expenditures, and public health policy (Duval et al., 2006; Kushner & Foster, 2000).

For those willing to participate in a treatment regimen, comprehensive lifestyle interventions combining behaviour modification, cognitive behavioural therapy, and education have been recommended as an adjunct to physical activity and dietary modification (Galani & Schneider, 2007; Lau et al., 2007). While behaviour-based

interventions aimed primarily at weight loss have been successful in the short-term, long-term maintenance is often challenging (Blaine, Rodman, & Newman, 2007) suggesting that 'weight loss' as a primary outcome measure may be an inappropriate first goal for many people (Nauta, Hospers, & Jansen, 2001). To improve the well-being of adults with obesity in the long-term, extended efforts in areas beyond weight management alone are warranted (Jeffery et al., 2000), and could prove efficacious for sustaining improvements in overall health and QoL (Nauta et al., 2001; Lim, Norman, Clifton, & Noakes, 2009). Self-esteem (SE) enhancement is considered one of these vital areas. SE is an important measure of psychological well-being associated with QoL, and for individuals with excess adiposity, low SE has been linked with interpersonal distress (Blaine et al., 2007; Kushner & Foster, 2000; Lee & Shapiro, 2003; Lo Coco, Gullo, Salerno, & Iacoponelli, 2011). Bacon and colleagues (2005) argued that a more general, lifestyle-based approach to obesity can result in greater improvements to SE compared to a more prescriptive approach (e.g., specified energy restrictions). Although there is growing recognition regarding the importance of targeting variables beyond the realm of physical health among individuals with obesity, further examination of psychosocial origins and consequences of obesity, such as QoL and SE, is required in order to treat the individual as a whole person (Lee & Shapiro, 2003).

Motivational Interviewing (MI) applied using Co-Active life coaching (CALC) tools (referred to hereafter as MI-via-CALC) is a theoretically grounded, cognitive behavioural approach (Irwin & Morrow, 2005; Newnham-Kanas, Morrow, & Irwin, 2010; Pearson, 2011, Whitworth, Kimsey-House, Kimsey-House, & Sandahl, 2007) that has shown considerable promise as an intervention for eliciting health improvements

among obese adults (e.g., Newnham-Kanas, Irwin, & Morrow, 2008; Newnham-Kanas, Irwin, Morrow, & Battram, 2011; van Zandvoort, Irwin, & Morrow, 2008, 2009). Encompassing the principles of MI, a client-centred counselling style that helps people explore and resolve their ambivalence for change (Miller & Rollnick, 2002; Rollnick & Miller, 1995), the Co-Active model is a specific style of life coaching - typically conducted over the telephone - which seeks to treat all aspects of a client's life through deepening his/her personal learning and/or forwarding him/her toward some action of his/her choosing (Whitworth et al., 2007). A primary assumption of MI-via-CALC is that clients are considered experts in their own lives and concomitantly are assumed to have the answers to their questions. The coach's role is to assist the client in accessing these answers in a supportive, motivating manner through exploring feelings and goals, and working with the client to brainstorm and identify solutions for attainment (Whitworth et al., 2007). Co-Active coaches undergo extensive training where they are taught to use numerous skills (e.g., active listening, articulating, acknowledging, offering reflective summaries, asking meaningful questions). The types of techniques and skills applied are non-prescriptive, personalized, and dependent on the particular needs of each client and the context and content of the coaching session (Whitworth et al., 2007).

Previous small-scale research studies (i.e., sample size $\leq$ 20) integrating MI-via-CALC as an intervention for obesity among adults have demonstrated significant improvements to physical and psychological indices (e.g., reduced waist circumference, body weight, and BMI; enhanced SE; improved QoL; Newnham-Kanas et al., 2008, 2011; van Zandvoort et al., 2008, 2009). However, to our knowledge, there has yet to be an MI-via-CALC-based intervention that includes sufficient statistical power and the use

of a comparison group, both of which are important considerations when seeking to establish further the viability of this particular methodology as an effective treatment for obesity.

University students were the target population of interest in many of the above-noted studies from which current understandings of the utility of MI-via-CALC have been garnered. Students are particularly important to study; as individuals positioned to become the policy makers, senior managers, and professionals of the future, the beliefs and attitudes held by university attendees towards health and health-related lifestyles are expected to have considerable influence on the health of the population (Stewart-Brown et al., 2000). Moreover, many of the physical activity behaviours and dietary habits developed between the ages of 18 and 24 are indicative of health status across the life span (Clement, Schmidt, Bernaix, Covington, & Carr, 2004). In Canada, it has been estimated that nearly 25% of individuals with some post-secondary education are obese (Statistics Canada, 2006), and greater impairment to SE has been found among younger adults when compared to their older counterparts (Zabelina, Erickson, Kolotkin, & Crosby, 2009). Informed by recommendations emanating from the aforementioned small-scale studies, it follows that there is a marked need to intervene in this particular population. Thus, in response to the paucity of research aimed at addressing the psychosocial needs of individuals with obesity using a "whole person" treatment perspective, a large-scale MI-via-CALC research program was developed (i.e., The Coaching towards Healthy Actions Naturally through Goal-related Empowerment [CHANGE] Study).

Because the LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) Program for Weight Management (Brownell, 2004) is a well-validated and thoroughly tested lifestyle-change program integrating educational and cognitive behavioural components, it was chosen to serve as the 'gold standard' (i.e., best available comparator found) for the comparison condition. Specifically, the efficacy and robustness of LEARN has been demonstrated previously as evidenced by publications in a number of well-respected journals (e.g., The New England Journal of Medicine; Journal of the American Medical Association), its endurance (i.e., new editions have been published approximately every two years), and, as can be found through simple internet searches, its widespread commercial-based use among health care professionals and lay people alike. Typically administered via self-help format (i.e., participants work through the program material independently) or in-person (e.g., Foster et al., 2003; Wadden et al., 2005; Womble et al., 2004), the LEARN program was adapted for the purposes of the present study to be delivered over the telephone. Therefore, the specific aim of the present study was to compare the impact of two different treatments incorporating elements of goal setting on the QoL and SE of university students with obesity during a 12-week intervention, and three- and six-months following its completion: MI-via-CALC, a personalized intervention focused on needs identified by the participant; and the LEARN Program, a prescriptive weight management program. In light of MI-via-CALC's demonstrated effectiveness in previous small-scale studies, it was hypothesized that this interactive condition would elicit results comparable to the more prescriptive, previously validated LEARN treatment among the dependent variables examined. Because weight-loss is a salient outcome measure in this population, a subsidiary aim

was to explore whether changes to SE and QoL dimensions were related to changes in weight between baseline and the six-month follow-up assessment. To our knowledge, no studies to date have examined these relationships as a function of participating in a MI-via-CALC based program; thus, no predictions were made regarding the resultant relationship trajectories.

Method

Design

A parallel group randomized trial was conducted to examine the primary outcome measures between the two treatment groups at baseline and all subsequent assessment time-points. Methodological details pertaining to the study protocol have been reported elsewhere (see Article 1). A brief procedural account in relation to the present study is provided below.

Participants

An apriori sample size calculation was conducted and the inclusion of 80 participants was deemed sufficient to detect a medium effect ($r^2 = .12$) of a two-level between-groups independent variable 90.4 percent of the time using a .05 alpha level (Lee, 2004). Participants were recruited at one large urban, Canadian university between September 2010 and May 2011 via e-mails distributed to the entire study body at the beginning of each term, as well as poster advertisements circulated throughout the campus. Eligibility criteria for inclusion required that individuals were university students aged 18-24 with a BMI $\geq 30 kg/m^2$; who could speak English fluently. In anticipation of participants modifying dietary and/or physical activity behaviours, those requiring strict medical monitoring (e.g., type 1 diabetes) or diagnosed with a condition

contraindicated for exercise were excluded in order to ensure their safety. Given the positive outcomes experienced in response to lifestyle modification among individuals with type 2 diabetes (Diabetes Prevention Program Research Group, 2003), those who self-reported this condition were accepted into the study. Once eligibility was confirmed by the Project Coordinator, participants were randomized to either the MI-via-CALC or the LEARN treatment group based on a computerized sequence generated by SPSS, and a baseline assessment was arranged at a mutually convenient time. Ethical approval was granted by the Office of Research Ethics at the host University.

MI-via-CALC Intervention

Subjects assigned to the MI-via-CALC treatment group received 12 weekly unscripted life coaching sessions (lasting 30 to 45 minutes) over the telephone with a randomly assigned, volunteer Certified Professional Co-Active Life Coach (CPCC) recruited and screened by the Project Coordinator. Eligibility criteria required that each CPCC be formally trained and certified via the Coaches Training Institute (2010), reside in North America, and commit to coaching at least two participants over the course of the study either simultaneously or in succession. Matches were based on the enrollment timeframe and availability of the CPCC (i.e., whether s/he could take on a new participant considering his/her schedule, additional commitments, etc.). In total, 16 coaches were enrolled to deliver the MI-via-CALC intervention (Canada, $n = 7$; United States, $n = 9$); however, three withdrew shortly thereafter due to scheduling conflicts and personal issues. All coaches were advised to conduct the sessions in accordance with their CPCC training only, whereby topics for discussion are determined entirely by the participant, and employ CALC-specific techniques and skills. For example: designing an

alliance; being curious about that participant's experiences; acknowledging the participant and his/her actions; challenging him/her to attain goals; and holding the participant accountable to those actions. In keeping with the CALC method (Whitworth et al., 2007), the participant was responsible for calling the coach at a pre-arranged time each week with a topic (s)he wanted to discuss. The duo would then work collaboratively to explore the issue and identify solutions for goal attainment. Although the same number of sessions were prescribed to all enrollees, the content and skills employed within each varied and were dependent upon the individual needs of the participants. All coaching calls' content remained strictly confidential to coach and participant (for additional information on the CALC method, please refer to Whitworth et al., 2007).

LEARN Intervention

The LEARN Program for Weight Management (Brownell, 2004) is intended to assist people with developing the skills and confidence to lose weight and maintain this loss over time. The content consists of 12 lessons aimed at modifying behaviours and thinking patterns in relation to the principles of lifestyle, exercise, attitudes, relationships, and nutrition. Commencing with a foundational overview pertaining to health with a specific focus on diet and physical activity, the lessons progress to include more advanced information on topics such as stimulus control, problem solving strategies, goal setting, and cognitive restructuring techniques. In order to enable greater self-awareness, participants are encouraged to personalize recommendations through exercises such as behavioural self-monitoring (e.g., keeping records of food and caloric intake). Similar to the MI-via-CALC group, participants received 12, 30-45 minute LEARN sessions over

the telephone. However, unlike the MI-via-CALC group, in order to maintain the standardized format of this condition, each LEARN participant received his/her calls from one of four randomly assigned "Specialists" (i.e., hired and thoroughly trained research assistants) who worked consistently with that participant on a weekly basis at a pre-determined time. Specialists trained participants in self-monitoring skills and record keeping, delivered the prescriptive lesson material in a lecture-style format (i.e., reading the information verbatim to the participant), and asked participants to complete assignments and behavioural logs between calls.

Procedure

All assessments were conducted by the Project Coordinator in the University's Health Promotion Lab at baseline, mid-intervention (i.e., 6-weeks), post-intervention (i.e., 12-weeks), and 3- and 6-months following the intervention. At the initial baseline meeting, participants were given a letter of information detailing the nature of the study and written informed consent to participate was acquired. Blinding to treatment allocation was concealed from participants until this time. At each assessment time-point, participants completed a series of validated questionnaires (see below) using an on-line server and then had their height (baseline only), weight, and weight circumference measured.

Main Outcome Measures

The Short Form 36-item Functional Health Status Scale (SF-36; Ware, 2008). The SF-36 is a validated and well-established quality of life measure (Kushner & Foster, 2000; Ware, 2008) comprised of eight subscales and three composite measures that assesses physical, mental, and overall health status. The *Physical Functioning* subscale

measures the degree to which participants are limited when performing a variety of tasks during a typical day ranging from vigorous (e.g., running, lifting heavy objects), to moderate (e.g., pushing a vacuum cleaner), to basic activities of daily living (e.g., bathing oneself). Six of the subscales ask participants to describe their experience with a particular issue during the past four weeks: *Role-physical* assesses issues associated with work or other activities as a result of physical problems (e.g., Have you accomplished less than you would like?); *Bodily Pain* measures the degree of pain and limitations that arise when performing activities (e.g., How much bodily pain have you had?); *Vitality* measures participant levels of energy or 'pep' (e.g., How much of the time did you feel tired?); *Social Functioning* assesses the extent to which physical or emotional problems interfere with normal social activities (e.g., How much of the time has your physical health or emotional health interfered with your social activities?); *Role-emotional* measures limitations with work or other regular daily activities as a result of emotional problems (e.g., Have you cut down on the amount of time you spent on work or other activities?); and *Mental Health* assesses feelings such as nervousness and depression (e.g., How much of the time have you felt calm and peaceful?). Finally, the *General Health* subscale assesses the degree to which individuals feel that they are healthy overall (e.g., My health is excellent.).

For the purposes of the present paper, it was determined that the three primary composite measures, which take into account the aforementioned subscales and present the results as a mean, would be reported. *The General Physical Health* subscale combines the physical functioning, role-physical, bodily pain, and general health subscales while the *General Mental Health* subscale is comprised of the vitality, social

functioning, role-emotional, and mental health subscales. *Overall Health* is determined by averaging the General Physical and Mental Health scales. Questions were answered using a number of Likert-type rating scales ranging from two to six response options. Previous research supports the internal consistency of these subscales (Cronbach's $\alpha \geq .79$; Linder & Singer, 2003; Ware, 2008).

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES is a validated measure of SE that assesses subjective feelings pertaining to personal worth and self-respect. The 10-item questionnaire contains statements such as "I feel that I am a person of worth, at least on an equal plane with others," and, "I wish I could have more respect for myself." Participants were asked to respond on a 4-point Likert scale anchored at the extremes by (1) Strongly agree and (4) Strongly disagree. Previous research has deemed the RSES to be a reliable measure (Cronbach's $\alpha \geq .77$; Blascovich & Tomaka, 1993; Rosenberg, 1989).

Anthropometric Measures. Weight and height were obtained using the Tanita BWB-800S Digital Scale and HR-200 Height Rod. Waist circumference measurements followed the Heart and Stroke Foundation (2010) guidelines and the same tape was used at each assessment.

Data Analysis

All statistical analyses were performed using SPSS version 19; data were analyzed using the general linear model application. To compare both groups for the primary outcome variables and to reduce the probability of a Type I error, multiple repeated-measures analysis of variance (ANOVA) were conducted across the various time-points where time was a within subjects variable (i.e., baseline, 6-weeks, 12-weeks,

3-month, and 6-month). The scores for QoL, SE, and body weight were analyzed for those who completed either 12-week program in addition to at least one of the follow-up assessments. Evaluation occurred using the principle of intention to treat with the last observation carried forward to account for missing data. To limit the probability of making a Type I error further across the five time points, a Bonferonni correction adjustment was applied; as a result, statistical significance was set at 0.01% for these analyses.

Pearson bivariate correlation analyses were conducted to investigate the relationships between SE and participant weight; and the composite QoL dimensions (i.e., General Physical Health, General Mental Health, and Overall Health) and participant weight as a function of participating in the MI-via-CALC or LEARN conditions. Specifically, to examine the differences between groups over time, pre- (i.e., baseline) and post- (i.e., 6- month) residualized change scores were utilized for these analyses.

Results

Participants

After receiving more than 600 inquiries, 78 young adults who met the eligibility criteria were enrolled in the CHANGE Program by the study start date and met with the Project Coordinator to participate in a baseline assessment (seven of these individuals failed to return after this initial meeting and therefore were not included in the present study; see Figure 1.). To verify that the assumptions of randomization held between groups, t-tests were conducted to examine the baseline demographic variables and psychological outcome measures according to condition allocation; results revealed no

significant differences between those assigned to the MI-via-CALC (n = 36) and LEARN (n = 35) conditions ($p > .05$).

To examine the impact of the program on the SE and QoL of the enrollees over time, only those who completed the formal intervention and at least one of the follow-up assessments were included in the present study.[4] Scheduling conflicts (n = 5) and a deviation of the program from personal expectations (i.e., lack of fit; n = 11) were cited most commonly as reasons for withdrawal. Two individuals dropped-out of the program due to personal issues and the remaining decisions (n = 8) were unknown. Analyses of baseline demographics including age, weight, BMI, and waist circumference revealed no significant differences between those who dropped-out of the program (n = 26) and those who completed (n = 45). A Pearson chi-square test was conducted to determine whether the number of individuals who dropped-out of the program compared with those who completed the program varied by group assignment (i.e., MI-via-CALC or LEARN); no significant differences were observed, $\chi^2(1, n = 71) = 1.16$, $p = .28$. In addition, a univariate analysis of variance was conducted for each of the psychological outcome measures at baseline revealing no differences among the SF-36 subscales; however, a significant difference was observed for SE ($p < .05$, $\eta^2 = .065$) between those who completed the program and those who dropped out.

In total, 45 participants completed the 12-week treatment program plus one or more of the follow-up assessments (i.e., 3-month, n = 41; 6-month, n = 38) and were

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[4] An intention to treat analysis was conducted for all participants who began the program (n = 71) and approximately 28.4% of the missing data was replaced. While the authors recognize the limitations inherent in using a smaller sample size, it was determined that maintaining a sample of 45 participants with approximately 5% of the missing data replaced was more reflective of the changes taking place.

included in the present analysis. Among these 45 individuals, there were no significant differences observed between the two treatment groups at baseline for the demographic or primary outcome measures. Demographics for these participants by group and time point can be found in Table 1.

SF-36. The first set of analyses was conducted to determine whether changes occurred to quality of life via the composite functional health status measures over the course of the program and through the follow-up period (see Table 2). Separate 2 (treatment group) x 5 (time-baseline/6-week/12-week/3-month/6-month) repeated measures ANOVAs were conducted. No group effects or group by time interactions were observed. However, analysis did reveal a significant effect for time between baseline and six months for: General Physical Health [$F(4,40) = 11.2$, $p < .001$, $\eta^2 = .53$]; General Mental Health [$F(4,40) = 10.8$, $p < .001$, $\eta^2 = .52$]; and Overall Health; [$F(4,40) = 12.1$, $p < .001$, $\eta^2 = .55$]. Additional analyses revealed that changes occurred specifically between baseline and week 6 for General Physical Health [$F(1,43) = 15.6$, $p < .001$, $\eta^2 = .27$]; General Mental Health [$F(1,43) = 8.9$, $p < .01$, $\eta^2 = .17$]; and Overall Health [$F(1,43) = 10.3$, $p < .01$, $\eta^2 = .19$]; and also between weeks 6 and 12 for the same subscales: General Physical Health [$F(1,43) = 9.8$, $p < .01$, $\eta^2 = .18$]; General Mental Health [$F(1,43) = 12.8$, $p = .001$, $\eta^2 = .23$]; and Overall Health [$F(1,43) = 13.2$, $p = .001$, $\eta^2 = .23$]. Means for SF-36 subscales by group over time are depicted in Figures 2-4.

RSES. Employing the same 2 X 5 repeated measures analysis for SE, only a significant time effect was found [$F(4,40) = 7.6$, $p < .001$, $\eta^2 = .43$]. Further analyses revealed that changes occurred specifically between weeks 6 and 12 [$F(1,43) = 18.2$, $p < .001$, $\eta^2 = .30$]. No significant improvements were observed between baseline and week

six, or after the 12-week time-point, and no between group interactions or group by time effects occurred (see Figure 5). Table 2 contains descriptive statistics for SE by time-point.

Participant Weight. Using the same analysis as employed above for QoL and SE again revealed a significant effect of time for weight between baseline and the 6-month follow-up [$F(4, 40) = 3.7$, $p = .01$, $\eta^2 = .27$]. Additional analyses revealed that changes occurred specifically between baseline and week 6 [$F(1,43) = 10.05$, $p < .01$, $\eta^2 = .19$], and weeks 6 and 12 [$F(1,43) = 6.6$, $p = .01$, $\eta^2 = .13$]. No main effect for group or group by time interactions were observed (see Figure 6).

Correlation Analyses. Bivariate correlations were conducted to examine the relationships between SE and body weight changes, and the composite QoL dimensions and body weight changes as a function of participating in the MI-via-CALC and LEARN conditions ($n = 45$). Results revealed a significant negative relationship between changes in weight and the General Physical Health Subscale ($r = -.31$, $p < .05$); however, no additional significant correlations were found.

Figure 1. CONSORT Flow Diagram

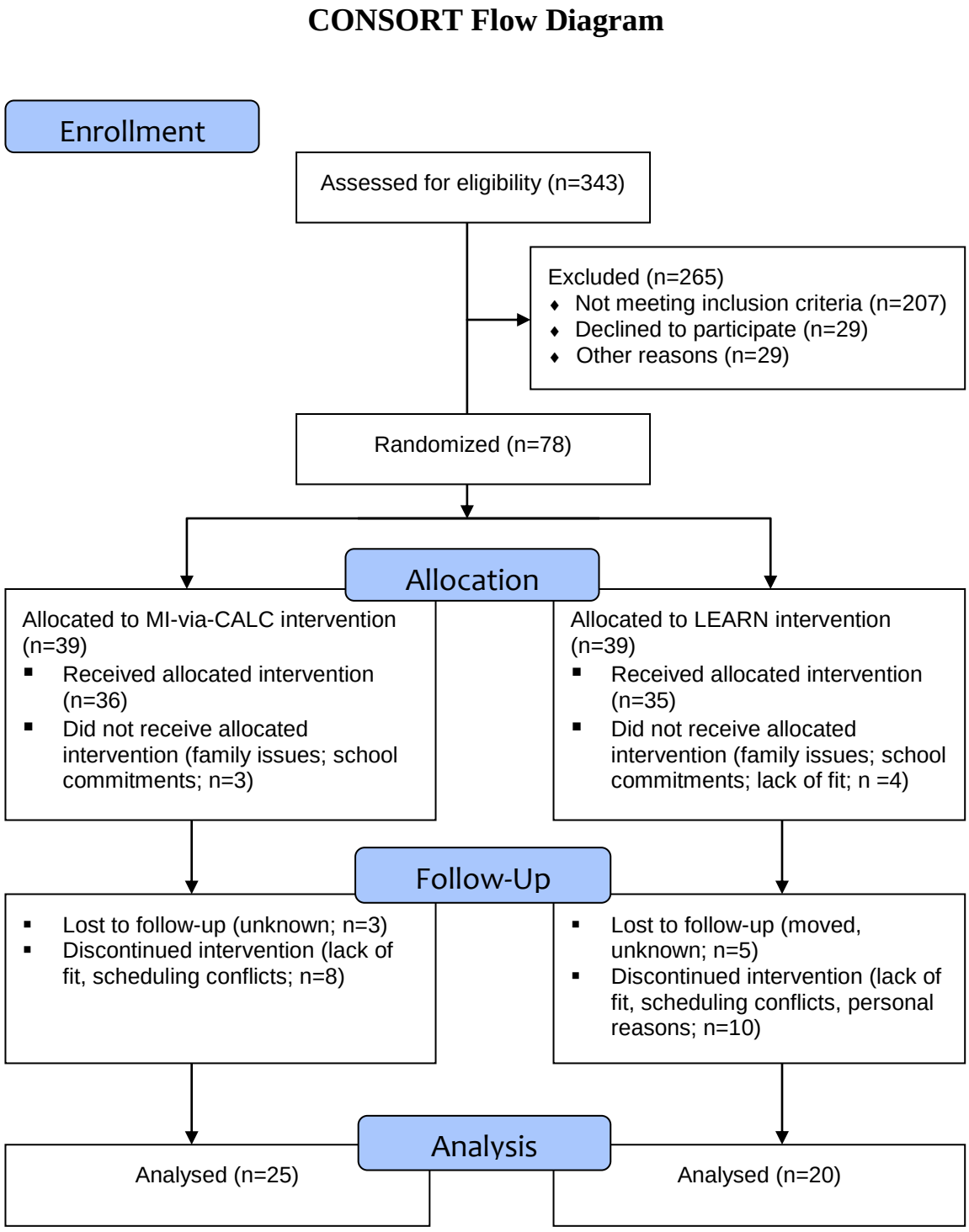


Table 1. Participant demographics by time-point (n = 45)

	Baseline		Mid-Program (6 week)		Post-Program (12 week)		3 month follow-up		6 month follow-up	
Demographic	M*	L	M	L	M	L	M	L	M	L
Age (year)	20.5 (1.7)[1]	21.4 (1.8)	-	-	-	-	-	-	-	-
Sex			-	-	-	-	-	-	-	-
Women	21	13	-	-	-	-	-	-	-	-
Men	4	7	-	-	-	-	-	-	-	-
Ethnicity										
White	19	12								
Chinese	1	1								
South Asian	1	2								
Black	1	2								
Latin American	1	2								
Other	2	1								
Height (in)	66.5 (3.5) [1]	66.7 (3.2)	-	-	-	-	-	-	-	-
Weight (lb)	221.7 (36.8)	220.7 (32.6)	220.3 (38.8)	216.8 (31.3)	219.1 (40.8)	212.9 (29.5)	218.2 (39.7)	212.7 (28.6)	216.4 (39.1)	212.6 (28.6)
Waist circumference (in)	44.1 (4.1)	43.7 (4.2)	43.9 (4.2)	43.2 (3.9)	43.6 (4.5)	42.7 (4.0)	43.2 (4.9)	43.0 (3.8)	43.4 (5.0)	42.8 (4.1)

*M = MI-via-CALC Condition; L = LEARN Condition; [1] Mean (± standard deviation) unless indicated otherwise

Table 2. Descriptive statistics for quality of life and self-esteem subscales by group over time

	MI-via-CALC Group (n = 25)					LEARN Group (n = 20)				
Variable	Baseline	Mid 6-week	Post 12-week	3-month follow-up	6-month follow-up	Baseline	Mid 6-week	Post 12-week	3-month follow-up	6-month follow-up
Physical Function	80.0 (13.8)	82.8 (14.4)	85.8 (15.1)	87.2 (12.9)	88.0 (11.0)	84.7 (17.3)	92.0 (9.1)	91.2 (13.1)	91.0 (13.3)	90.7 (12.9)
Role Physical	70.0 (29.7)	82.0 (22.3)	87.0 (27.1)	87.0 (24.1)	89.0 (22.9)	81.2 (25.5)	88.7 (25.0)	90.0 (27.4)	85.0 (32.8)	90.0 (27.4)
Bodily Pain	73.2 (20.2)	71.9 (20.1)	81.8 (16.4)	81.6 (19.4)	84.1 (15.2)	79.5 (16.5)	77.0 (17.7)	80.8 (16.5)	79.8 (20.9)	80.8 (22.0)
General Health	48.4 (19.6)	59.8 (19.9)	65.8 (19.3)	65.1 (19.6)	65.4 (22.2)	55.4 (23.5)	65.2 (21.3)	71.2 (22.1)	69.3 (21.6)	71.7 (18.9)
Vitality	45.2 (19.5)	58.0 (15.8)	63.2 (19.0)	58.8 (22.8)	60.6 (20.3)	46.2 (19.7)	54.2 (21.1)	59.7 (26.4)	57.0 (23.2)	57.7 (24.7)
Social Functioning	71.2 (20.0)	79.7 (14.7)	85.6 (17.8)	82.6 (23.1)	86.2 (20.7)	68.3 (27.0)	73.3 (27.3)	83.3 (25.3)	86.4 (22.4)	85.6 (19.5)
Role Emotional	57.2 (39.2)	60.0 (38.5)	81.4 (34.8)	76.1 (36.6)	66.7 (39.7)	53.2 (39.7)	51.6 (41.2)	65.0 (48.9)	76.7 (34.4)	75.1 (32.2)
Mental Health	65.3 (15.0)	73.0 (15.2)	78.1 (14.3)	72.0 (23.6)	73.3 (20.3)	63.2 (16.8)	71.4 (17.7)	75.0 (17.9)	73.6 (17.8)	74.4 (13.3)
General Physical Health	63.2 (14.8)	70.7 (13.7)	76.5 (16.2)	75.7 (15.8)	77.2 (14.6)	69.2 (13.7)	75.2 (13.9)	78.3 (16.7)	76.1 (17.0)	77.9 (16.9)
General Mental Health	57.5 (18.1)	66.1 (16.9)	74.9 (18.1)	70.9 (22.8)	70.4 (21.8)	57.3 (19.3)	63.2 (19.1)	70.9 (23.2)	72.5 (19.8)	72.9 (18.4)
Overall Health	63.8 (15.4)	70.9 (14.5)	78.6 (16.9)	76.3 (18.1)	76.9 (17.0)	66.4 (16.0)	71.6 (15.1)	77.0 (19.4)	77.3 (17.7)	78.3 (16.9)
Self-Esteem	20.8 (5.1)	21.4 (6.0)	24.5 (4.8)	24.3 (5.6)	23.4 (6.7)	19.6 (6.1)	21.5 (4.9)	23.2 (5.7)	22.1 (5.0)	22.6 (4.5)

Figure 2. Means for SF-36 General Physical Health subscale by group over time

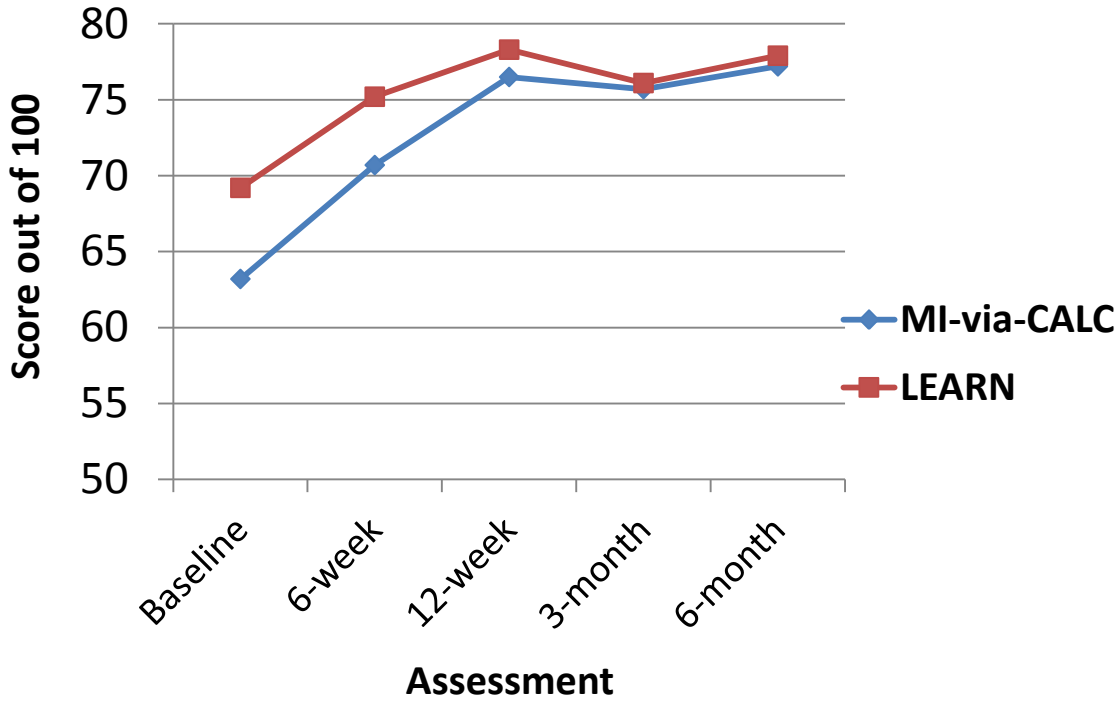


Figure 3. Means for SF-36 General Mental Health subscale by group over time

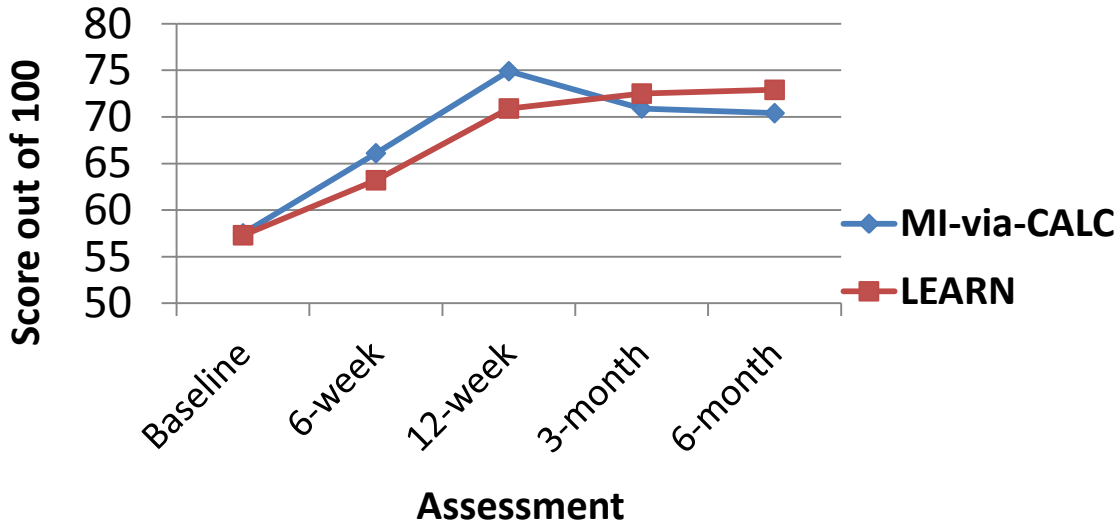


Figure 4. Means for SF-36 Overall Health subscale by group over time

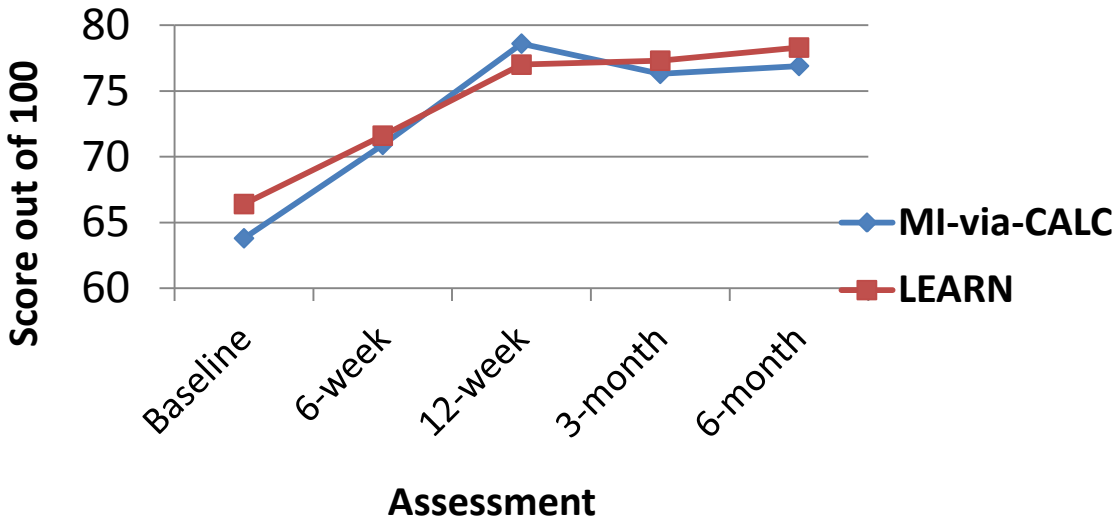


Figure 5. Means for RSES by group over time

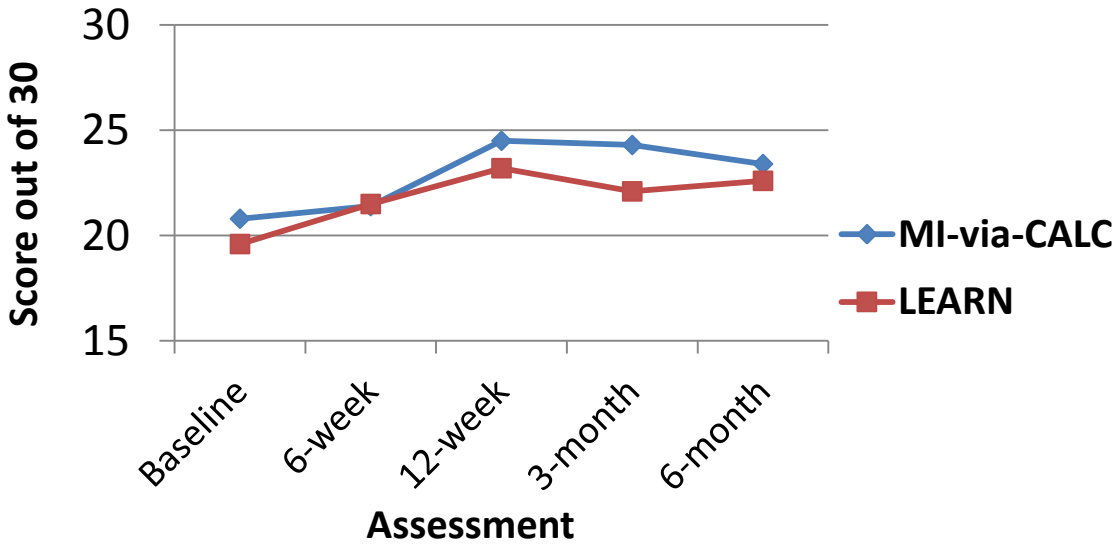
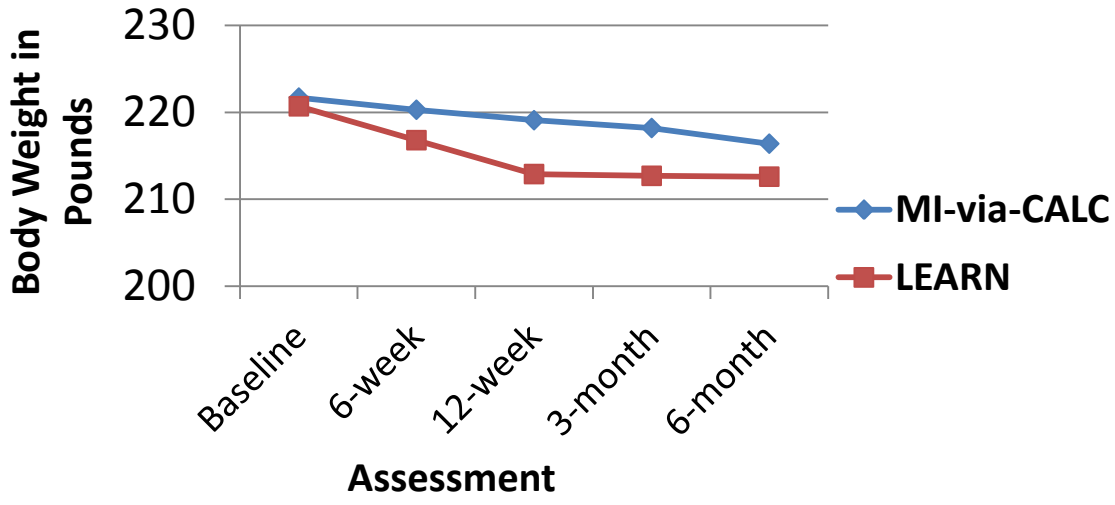


Figure 6. Means for participant weight by group over time



Discussion

The primary purpose of this study was to compare the impact of MI-via-CALC to the LEARN Program for Weight Management on the QoL and SE of university students with obesity over the course of a 12-week, telephone-based intervention, with follow-up assessments at three-and six-months post-intervention. A subsidiary aim was to explore whether changes to SE and QoL dimensions were related to changes in weight between baseline and the six-month follow-up assessment. In keeping with our original hypothesis, the interactive MI-via-CALC condition fared comparably to the more prescriptive LEARN treatment across the variables examined. This indicates that: a) both are effective at eliciting positive changes to QoL dimensions and SE in young adults with obesity; b) MI-via-CALC appears to be on par with LEARN, a well-validated lifestyle modification program, as a viable obesity treatment that helps to facilitate sustainable change; and c) to meet the expectations of treatment-seeking young adults with obesity, both treatments need to be made available, and in some cases merged, based on the differential learning styles and needs of each individual. In light of the substantial number of university students who struggle with their weight, these findings have several implications for practice and contribute further to our understanding of how QoL and SE are experienced within this population.

When faced with the choice of participating in an interactive, dialogue based program or one that is more prescriptive and education-based, it is important to know which will produce better outcomes among young adults seeking treatment for obesity. MI-via-CALC can be a highly emotive approach to health behaviour change (Whitworth et al., 2007). Coaches challenge individuals to explore their personal reasons for making

the choices that they do, and encourage self-learning and action in service of helping them to achieve their full potential. A primary tenet within the MI-via-CALC model is 'choice'. In the "real world," individuals interested in this form of treatment will seek out a Co-Active coach of their own volition. This process contrasts with the scientific research methodology employed in the present study whereby participants were assigned randomly to their condition and their treatment provider. While beneficial for enhancing internal validity, randomization does have limitations when considering the applicability of results beyond the research setting. That is, not all individuals respond well to a dialogue-based treatment. For some, the provision of pertinent educational information accompanied by didactic and specific instructions on how to make changes is a preferable method. Given that nearly 50% of the individuals who dropped out of the program cited lack of fit as their reason (MI-via-CALC, $n = 4$; LEARN, $n = 7$), it is clear that personal learning styles and needs play a significant role with regard to an individual's receptivity to a particular treatment format. MI-via-CALC and LEARN elicited comparable outcomes in the present study. Therefore, it stands to reason that allowing individuals to choose their own condition could result in greater treatment effects and less attrition when seeking to attenuate obesity rates in this population.

In the field of obesity treatment and management, evaluation of health related QoL has been deemed an essential clinical and research outcome measurement (Fontaine & Barofsky, 2001; Kushner & Foster, 2000). In this study, MI-via-CALC and the LEARN Program elicited significant improvements to QoL domains in as little as six weeks, and these enhancements continued up to the six-month time-point. These findings are congruent with previous MI-via-CALC and LEARN–based studies examining quality

of life in adults with obesity (e.g., Newnham-Kanas et al., 2011; Womble et al., 2004). Individuals struggling with their weight tend to report limitations in their capacity to perform day-to-day physical activities (Fontaine & Barofsky, 2001; Fontaine et al., 1996). The present study revealed that changes in weight were related negatively to changes in General Physical Health between baseline and the 6-month follow-up for both groups. Given that excess weight places increased demands on multiple organ functions including the heart, vascular, respiratory, and musculoskeletal systems, and the skin, all of which can be perceived acutely by the individual (e.g., shortness of breath, mobility limitations, increased sweating; Kushner & Foster, 2000), it is not surprising that an association was found among these variables. Researchers recently assessed the prospective relationship between obesity and physical and mental health-related QoL over five years among nearly 6000 Australian adults. They found that poor QoL could be considered a risk factor for future weight gain (Cameron et al., 2012). In light of the number of young adults with weight challenges and the obesity-related burden that can be caused by a lower QoL, the improvements observed in the present study are promising, and highlight the importance of focussing on the domain of QoL during treatment with a view towards promoting long-term sustainability.

Significant changes to SE were observed between weeks 6 and 12 of the CHANGE Program and improvements were unrelated to the weight loss experienced among participants. Findings of a meta-analysis examining the effects of weight loss treatment on weight and SE revealed that individuals who complete these programs typically emerge with greater SE, although they are not substantially lighter, a finding which suggests that the short-and long-term impact of weight loss treatment on SE is

likely moderated by other variables (Blaine et al., 2007). These findings parallel research conducted in related domains of health psychology. For example, body image researchers have found that weight loss is correlated with significant improvements to body image; however, the degree of improvement does not seem to be related to the amount of weight lost, indicating that additional factors such as secondary, appearance-related changes (e.g., enhanced muscle tone, clothing fitting better), or participating in the actual treatment might be responsible (Foster & Matz, 2002; Foster, Wadden, & Vogt, 1997; Martin & Lichtenberger, 2002). Similarly, participants in the present study may have experienced enhancements to SE as a function of participating in the CHANGE Program itself. Moreover, it is also possible that experiencing improvements to QoL dimensions needs to occur prior to SE endorsements in this context; more research is needed to verify these relationships.

A number of commonalities exist across the present study's two treatments which could have contributed to the significant improvements observed. First, while the content of the phone calls within each treatment varied between groups, what was consistent across both conditions was the element of contact time. Irrespective of group allocation, each participant received approximately 40 minutes weekly with his/her assigned coach or specialist. Findings from previous research examining facilitators for diabetes self-management have shown that the degree of contact time between an educator and patient can serve as a significant predictor of improved glycemic control, an important indicator of chronic disease complications associated with diabetes (Norris, Lau, Smith, Schmid, & Engelgau, 2002). In the context of overweight and obesity, research has revealed that the degree of contact time maintained with a treatment provider over the telephone can

predict participant weight loss outcomes over the course of a behavioural weight-loss program (Unick, Jakicic, & Marcus, 2010). Thus, it is possible that an element of social support contributed to enhancements in SE and QoL dimensions as well as weight loss across both conditions in the present study, albeit to unknown degrees. For individuals struggling with their weight, personal contact time may be an integral element for inclusion when seeking to elicit positive changes to psychosocial and anthropometric profiles.

To ensure consistency with each condition's delivery format, and using the traditional approach of MI-via-CALC, it was necessary to adapt the LEARN Program for administration over the telephone. Given the positive results observed, it appears that the LEARN Program is an important medium for the provision of obesity treatment in this population. For both interventions, not only is talking on the telephone convenient and accessible, but it allows individuals to remain in the privacy of a location of their choosing when discussing personal issues which may be at the root of their struggles with weight and lifestyle choices.

Strengths and Limitations

In contrast to previous studies which have typically delivered LEARN in person or via self-help format, to the best of our knowledge, this is the first study to administer the program over the telephone. Moreover, this is also the first MI-via-CALC study to use a comparison group to assess its effectiveness as a treatment for obesity. While previous small-scale MI-via-CALC studies have elicited significant positive outcomes in SE and QoL among individuals struggling with their weight, this study extends these findings through its inclusion of the largest known sample size recruited to date.

Improvements in the MI-via-CALC group also compared favourably with LEARN, thereby lending additional credence to its utility as a viable health behaviour change methodology.

Previous research has shown that attrition is likely when individuals wanting to make lifestyle changes are assigned to a control condition (Mantler, Irwin, & Morrow, 2010). While the present study incorporated a validated comparison condition, a true control group was not included which could be viewed as a limitation. Moreover, the generalizability of this study's findings is hindered by the low percentage of male participants, the number of dropouts, and limited power of analysis. Finally, the CPCCs involved in the present study were trained in the same rigorous manner (i.e., more than 200 hours of education and hands-on coaching experience; Coaches Training Institute, 2010) which can be viewed as a methodological strength. However, due to the confidential nature of the MI-via-CALC relationship and the discussions which occur therein, physiological or psychological outcomes cannot be attributed to isolated elements of this treatment thus limiting the deduction of specific causal mechanisms.

Future Directions

Based on the present study's findings, both utilized interventions hold considerable promise with respect to improving QoL and SE among young adults with obesity. Future investigations are warranted to: determine if the effects on these variables can be maintained beyond the six-month time period; uncover how these changes interact to elicit benefits in other health domains; and isolate the specific intervention components that contribute towards these enhancements. In addition, while a large sample size was recruited, the study was underpowered and resultant attrition rates were higher than

expected; thus, ensuing studies should sample to an even greater extent to account for a loss of participants to follow-up.

In light of the fact that nearly 50% of those who dropped-out of the study did so due to lack of fit, prior to enrolling participants in either type of treatment program, future studies should consider the inclusion of a baseline readiness interview whereby behaviour change history, expectations, and personal learning styles are assessed. With the help of a researcher/clinician, this will enable participants to identify personal strengths and challenges with regard to weight management (Aggarwal et al., 2012) and can also serve to uncover what has/has not worked well for them in the past, and how they respond to the provision of education-based information and self-help strategies versus discussing personal issues in a more interactive format. As a result, individuals could then be allocated to a treatment that best fits their personal learning styles and needs. According to Palmeira and colleagues (2010), self-esteem is a relatively stable aspect of one's personality; individuals with higher self-esteem have been shown to have a higher likelihood of finishing a weight loss program, independent of the amount of weight lost thereby emphasizing the importance of improving psychological well-being during treatment. From an adherence perspective, it was interesting that those individuals in the present study who did not complete the program had significantly lower self-esteem at baseline compared to those who finished. While inferences regarding this relationship cannot be made with certainty, it is possible that a requisite amount of self-esteem may be necessary prior to beginning a treatment program among individuals who struggle with their weight, something which could also be explored during an initial intake interview.

A number of barriers to participation in face-to-face obesity interventions have been identified (e.g., availability of programs, geographic proximity to the intervention location, transportation issues, time restrictions; Krukowski, Tilford, Harvey-Berino, & West, 2011). Previous studies in other areas of health (e.g., smoking cessation) have examined the impact of telephone hotlines on behaviour change in at-risk populations and found that they are efficient, and able to reach a wide range of individuals (e.g., Tzelepis, Paul, Walsh, McElduff, & Knight, 2011). In a similar vein, the results of the present study could be used to inform the development of an integrated phone-based treatment that would provide callers with a comprehensive assimilation of MI-via-CALC and LEARN based on the needs and preferences of each individual. Because participants responded well to the provision of health-based information and cognitive restructuring strategies (i.e., LEARN), and working interactively with a MI-via-CALC professional to achieve personal goals, it may be the case that combining these treatments will have additive effects. During an intake interview, the coach and caller could determine collaboratively, the extent to which lifestyle education and interactive dialogue would comprise each session. This would enable those who are struggling with their weight to obtain one-on-one personalized support in their own environment from a thoroughly trained CPCC equipped with health information, cognitive restructuring tools, and behaviour modification techniques. Consistent with the MI-via-CALC method (Whitworth et al., 2007), providing this personalized option and leaving the ultimate decision with the caller is an important vehicle for enhancing autonomy which has been shown to play an integral role in eliciting positive long-term health behaviour change (Ryan, Patrick, Deci, & Williams, 2008). From a public health perspective, this

particular modality has the potential to provide substantial reach in a cost-effective manner and therefore merits continued investigation as a viable treatment for obesity in this at-risk population.

In conclusion, the CHANGE Program has provided important insights into the impact of an interactive versus prescriptive intervention on the psychosocial and anthropometric profiles of young adults with obesity. Irrespective of group allocation, participants experienced significant improvements to QoL dimensions, SE, and body weight over the course of the 12-week program, changes which were generally maintained up to six months following the intervention. Elements of social support and the experience of participating in the program itself may have contributed toward these enhancements; however, future investigations are warranted to isolate specific contributory factors. In line with the MI-via-CALC model which emphasizes that clients are considered the experts in their own lives (Whitworth et al., 2007), the present findings highlight the uniqueness of individuals and their treatment inclinations. The MI-via-CALC and the LEARN Program compare favourably with one another when delivered in this manner indicating that both treatments are warranted. Through focusing on a participant's/client's personal learning styles and needs, MI-via-CALC and LEARN offer a unique framework from which the development of future obesity-based treatments can emerge. A larger-scale study that allows participants to choose their treatment allocation in line with these needs (i.e., MI-via-CALC, LEARN, or a combination of the two) is now recommended.

This study provided important insights into the psycho-social impact of excess adiposity on the lives of individuals struggling with their weight, and the value of two

different treatments in attenuating this impact. Because one compartment of an individual's life inevitably affects the others, a cornerstone of the Co-Active method is that the whole life must be addressed (Whitworth et al., 2007). From an evidentiary perspective, this is also integral when seeking to establish further, the utility of MI-via-CALC as a viable behaviour change method. Thus, the next chapter builds on these psycho-social findings with a view towards examining the physiological dimensions of obesity. Using a self-management lens, this entailed an examination of the two treatments on risk factors associated with the development of type 2 diabetes, which can be described as obesity's epidemic-partner; body composition, blood glucose and lipid profiles, and dietary consumption patterns were assessed. The experiences of the participants enrolled in both treatment conditions were also examined qualitatively to gauge the independent impact of MI-via-CALC and LEARN further.

References

Aggarwal, S., Arena, R., Cuda, L., Hauer, T., Martin, B., Austford, L., & Stone, J. A. (2012). The independent effect of traditional cardiac rehabilitation and the LEARN program on weight loss: A comparative analysis. *Journal of Cardiopulmonary Rehabilitation and Prevention, 32*, 48-52.

Bacon, L., Stern, J. S., Van Loan, M., & Keim, N. L. (2005). Size acceptance and intuitive eating improve health for obese, female chronic dieters. *Journal of the American Dietetic Association, 105*, 929-936.

Blaine, B. E., Rodman, J., & Newman, J. M. (2007). Weight loss treatment and psychological well-being: A review and meta-analysis. *Journal of Health Psychology, 12*, 66-82.

Blascovich, J, & Tomaka, J. (1993). Measures of self-esteem. In J. P. Robinson, P. R. Shaver, and L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes, Third Edition,* (pp. 115-160). Ann Arbor: Institute for Social Research.

Bray, G. A. (2004). Medical consequences of obesity. *Journal of Clinical Endocrinology and Metabolism, 89*(6), 2583-2589.

Brownell, K. D. (2004). The LEARN® Program for Weight Management (10th ed.). Dallas, Tx: American Health Publishing.

Cameron, A. J., Magliano, D. J., Dunstan, D. W., Zimmet, P. Z., Hesketh, K., Peeters, A., & Shaw, J. E. (2012). A bi-directional relationship between obesity and health-related quality of life: Evidence from the longitudinal AusDib study. *International Journal of Obesity, 36*, 295-303.

Clement, J. M., Schmidt, C. A., Bernaix, L. W., Covington, N. K., & Carr, T. R. (2004). Obesity and physical activity in college women: Implications for clinical practice. *Journal of the American Academy of Nurse Practitioners, 16(7),* 291-299.

Coaches Training Institute (2010). Coach training: Co-Active coach training program. Retrieved January 2, 2012, from http://www.thecoaches.com/coach-training/

De Zwaan, M., Petersen, I., Kaerber, M., Burgmer, R., Nolting, B., Legenbauer, T., … Herpertz, S. (2009). Obesity and quality of life : A controlled study of normal-weight and obese individuals. *Psychosomatics, 50*(5), 474-482.

Diabetes Prevention Program Research Group (2003). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine, 346,* 393-403.

Duval, K., Marceau, P., Perusse, L., & Lacasse, Y. (2006). An overview of obesity-specific quality of life questionnaires. *Obesity Reviews, 7*, 347-360.

Galani, C., & Schneider, H. (2007). Prevention and treatment of obesity with lifestyle interventions: Review and meta-analysis. *International Journal of Public Health, 52,* 348-359.

Fontaine, K. R., & Barofsky, I. (2001). Obesity and health-related quality of life. *Obesity Reviews, 2,* 173-182.

Fontaine, K. R., Cheskin, L. J., & Barofsky, I. (1996). Health-related quality of life in obese persons seeking treatment. *Journal of Family Practice, 43,* 265–270.

Foster, G. D., Wyatt, H. R., Hill, J. O., McGuckin, B. G., Brill, C., Mohammed, S., … Klein, S. (2003). A randomized trial of a low-carbohydrate diet for obesity. *The NewEngland Journal of Medicine, 348(21),* 2082-2090.

Foster, G. D., & Matz, P. E. (2002). Weight loss and changes in body image. In T. F. Cash & T. Pruzinsky (Eds.), *Body image: A handbook of theory, research, and clinical practice* (pp. 405-413). New York: Guilford Press.

Foster, G. D., Wadden, T. A., & Vogt, R. A. (1997). Body image in obese women before, during and after weight loss treatment. *Health Psychology, 16*(3), 226-229.

Heart and Stroke Foundation (2010). *Healthy waists.* Retrieved November 22, 2011, from http://www.heartandstroke.on.ca/site/c.pvI3IeNWJwE/b.4018281/k.8698/Healthy_Waists.htm

Hill, A. J., & Williams, J. (1998). Psychological health in a non-clinical sample of obese women. *International Journal of Obesity, 22,* 578-583.

Irwin, J. D., & Morrow, D. (2005). Health promotion theory in practice: an analysis of Co-Active coaching. *International Journal of Evidence Based Coaching and Mentoring, 3*(1), 29-38.

Jain, A. (2004). What works for obesity?: A summary of the research behind obesity interventions. *BMJ Clinical Evidence,* 1-57.

Jeffery, R. W., Epstein, L. H., Wilson, G. T., Drewnowski, A., Stunkard, A. J., Wing, R. R., & Hill, D. R. (2000). Long-term maintenance of weight loss: current status. *Health Psychology, 19,* 5-16.

Krukowski, R. A., Tilford, J. M., Harvey-Berino, J., & West, D. S. (2011). Comparing behavioral weight loss modalities: Incremental cost-effectiveness of an Internet-based versus an in-person condition. *Obesity, 19*(8), 1629-1635.

Kushner R. F., & Foster G. D. (2000). Obesity and quality of life. *Nutrition, 16,* 947-952.

Lau, D. C. W., Douketis, J. D., Morrison, K. M., Hramiak, I. M., & Sharma, A. M., & Ur, E. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *Canadian Medical Association Journal, 176*(8), S1-13.

Lee, C. J. (2004). Horatio (Version 3.0) [Computer Software]. Faculty of Helth Sciences, The University of Western Ontario, London, Canada: Author.

Lee, L., & Shapiro, C. M. (2003). Psychological manifestations of obesity. *Journal of Psychosomatic Research, 55*(6), 477-479.

Lim, S. S., Norman, R. J., Clifton, P. M., & Noakes, M. (2009). Psychological effective of prescriptive vs general lifestyle advice for weight loss in young women. *Journal of the American Dietetic Association, 109,* 1917-1921.

Linder, J. A. & Singer, D. E. (2003). Health-related quality of life of adults with upper respiratory tract infections. *Journal of General Internal Medicine, 18*(10), 802-807.

Lo Coco, G., Gullo, S., Salerno, L. & Iacoponelli, R. (2011). The association among interpersonal problems, binge behaviors, and self-esteem, in the assessment of obese individuals. *Comprehensive Psychiatry, 52,* 164-170.

Mantler, T., Irwin, J. D., & Morrow, D. (2010). Assessing motivational interviewing through Co-Active life coaching tools as a smoking cessation intervention: A demonstration study. *International Journal of Evidence Based Coaching and Mentoring, 8*(2), 49-63.

Martin, K. A., & Lichtenberger, C. M. (2002). Fitness enhancement and body image

change. In T. F. Cash & T. Pruzinsky (Eds.), *Body image: A handbook of theory, research, and clinical practice* (pp. 414-421). New York: Guilford Press.

Miller, W. R., & Rollnick, S. (2002). *Motivational Interviewing: Preparing people for change* (2nd ed.). New York, NY: The Guildford Press.

Nauta, H., Hospers, H., & Jansen, A. (2001). One-year follow-up effects of two-obesity treatments on psychological well-being and weight. *British Journal of Health Psychology, 6,* 271-284.

Newnham-Kanas, C. E., Irwin, J. D., & Morrow, D. (2008). Co-Active life coaching as a treatment for people with obesity. *International Journal of Evidence Based Coaching and Mentoring, 6,* 1-12.

Newnham-Kanas, C., Morrow, D., & Irwin, J. D. (2010). Motivational coaching: A functional juxtaposition of three methods for health behaviour change: Motivational interviewing, coaching, and skilled helping. *International Journal of Evidence Based Coaching and Mentoring, 8*(2), 27-48.

Newnham-Kanas, C., Irwin, J. D., Morrow, D., & Battram, D. (2011).The quantitative assessment of Motivational Interviewing using Co-Active life coaching skills as a treatment for adults struggling with obesity. *International Coaching Psychology Review, 6*(2), 211-225.

Newnham-Kanas, C., Morrow, D., & Irwin, J. D. (2010). Motivational coaching: A functional juxtaposition of three methods for health behaviour change: Motivational interviewing, coaching, and skilled helping. *International Journal of Evidence Based Coaching and Mentoring, 8*(2), 27-48.

Norris, S. L., Lau, J., Smith, S. J., Schmid, C. H., & Engelgau, M. M. (2002). Self-

management education for adults with type 2 diabetes: A meta-analysis of the effect on glycemic control. *Diabetes Care, 25,* 1159-1171.

Palmeira, A. L., Markland, D. A., Silva, M. N., Branco, T. L., Martins, S. C., Minderico, C. S., … Teixeira, P. (2009). Reciprocal effects among changes in weight, body image, and other psychological factors during behavioral obesity treatment: a mediation analysis. *International Journal of Behavioral Nutrition and Physical Activity, 6*(9), 1-12.

Pearson, E. (2011). The 'how to' of health behaviour change brought to life: A theoretical analysis of the Co-Active coaching model and its underpinnings in self-determination theory. *Coaching: An International Journal of Theory, Research and Practice, 4*(2), 89-103.

Public Health Agency of Canada, 2011. Obesity in Canada. A joint report from the Public Health Agency of Canada and the Canadian Institute for Health Information. Cat.: HP5-107/2011E-PDF

Rollnick, S. & Miller, W. R. (1995). What is motivational interviewing? *Behavioural and Cognitive Psychotherapy, 23*, 325-334.

Rosenberg, M. (1965). *Society and the Adolescent Self-Image*. Princeton, New Jersey: Princeton University Press.

Rosenberg, M. (1989). *Society and the Adolescent Self-Image*. (Rev. ed.). Middletown, CT: Wesleyan University Press.

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on self-determination theory. *The European Health Psychologist, 10*, 2-5.

Shields, M., Carroll, M. D., & Ogden, C. L. (2011). *Adult obesity prevalence in Canada and the United States* (Data Brief No. 56). Retrieved from the National Center for Health Statistics website: http://www.cdc.gov/nchs/data/databriefs/db56.htm.

Shipper H, Clinch J, Powell V. Definition and conceptual issues. In: Spilker B (ed.) *Quality of Life Assessment in Clinical Trials*. Raven Press Ltd: New York, 1990, pp. 11–24.

Statistics Canada. (August, 2006a). *Health Reports* (Catalogue no. 82-003-XPE, 17(3)). Ottawa, Ontario, Canada: Health Statistics Division.

Stewart-Brown, S., Evans, J., Patterson, J., Petersen, S., Doll, H., Balding, J., & Regis, D. (2000). The health of students in institutes of higher education: An important and neglected public health problem? *Journal of Public Health Medicine, 22*(4), 492-499.

Strychar, I. (2004). Fighting Obesity: A Call to Arms. *Canadian Journal of Public Health, 95(1),* 12-14.

Tuthill, A., Slawik, H., O'Rahilly, S., & Finer, N. (2006). Psychiatric co-morbidities in patients attending specialist obesity services in the UK. QJM : Monthly Journal of the Association of Physicians, 99, 317-325.

Tzelepis, F., Paul, C. L., Walsh, R. A., McElduff, P., & Knight, J. (2011). Proactive telephone counseling for smoking cessation: Meta-analyses by recruitment channel and methodological quality. *Journal of the National Cancer Institute, 103*, 1-20.

Unick, J. L., Jakicic, J. M., & Marcus, B. H. (2010). Contribution of behavior

intervention components to 24-month weight loss. *Medicine and Science in Sports and Exercise, 42*(4), 745-753

van Zandvoort M., Irwin, J. D., & Morrow, D. (2008). Co-Active coaching as an intervention for obesity among female university students. *International Coaching Psychology Review, 3*(3), 191-206.

van Zandvoort M., Irwin J. D., & Morrow D. (2009). The impact of Co-active life coaching on female university students with obesity. *International Journal of Evidence-Based Coaching and Mentoring, 7*(1), 104-118.

van der Merwe, M. T. (2007). Psychological correlates of obesity in women. *International Journal of Obesity, 31*, 14-18.

Wadden, T. A., Berkowitz, R. I., Womble, L. G., Sarwer, D. B., Phelan, S., Cato, R. K., … Stunkard, A. J. (2005). Randomized trial of lifestyle modification and pharmacotherapy for obesity. *The New England Journal of Medicine, 353*(20), 2111-2120.

Ware, J. D. *SF-36 Health Survey Update*. *Accessed* on November 20, 2008, from http://www.sf-36.org/tools/sf36.shtml#LIT

Whitworth, L., Kimsey-House, K., Kimsey-House, H., Sandahl, P. (2007). *Co-Active coaching: New skills for coaching people toward success in work and life* (2nd ed.). California: Davies-Black Publishing.

Womble, L. G., Wadden, T. A., McGuckin, B. G., Sargant, S. L., Rothman, R. A., & Krauthamer-Ewing, E. S. (2004). A randomized controlled trial of a commercial Internet weight loss program. *Obesity Research, 12*(6), 1011-1018.

World Health Organization (2011). *Obesity and overweight.* Retrieved November 12,

2011, from http://www.who.int/mediacentre/factsheets/fs311/en/index.html

Zabelina, D. L., Erickson, A. N., Kolotkin, R. L., & Crosby, R. D. (2009). The effect of age on weight-related quality of life in overweight and obese individuals. *Obesity, 17*, 1410-1413.

Article 4

The CHANGE Program: Comparing an interactive versus prescriptive approach to self-management among university students with obesity

An estimated 60% of Canadian adults are overweight (i.e., body mass index [BMI] $\geq$ 25kg/m^2) and more than one in four can be classified as obese (i.e., BMI $\geq$ 30kg/m^2; Public Health Agency of Canada, 2011; Shields, Carroll, & Ogden, 2011). While excess body weight increases the likelihood of developing a number of chronic health conditions, it is the cardiometabolic ramifications of obesity, such as type 2 diabetes mellitus (DM), that are among the most prevalent and detrimental (Padwal & Sharma, 2010). To date, over eight million Canadians are affected by DM (Canadian Diabetes Association, 2012) and are subsequently at risk for myocardial infarction, heart disease, stroke, and premature death, in addition to adverse complications such as blindness and end-stage renal disease (Almdal, Scharling, Jensen, & Vestergaard, 2004; Centers for Disease Control and Prevention, 2011). Exacerbating the issue is the positive relationship between increases to BMI and DM (Must et al., 1999). Because obesity is also an independent risk factor for cardiovascular disease, the risk for cardiovascular complications and mortality among individuals living with DM is heightened (Lew & Garfinkel, 1979). Given the human and financial burdens Canadians experience managing DM as an obesity-related co-morbidity (Birmingham, Muller, Palepu, Spinelli, & Anis, 1999), preventive measures are imperative (Gagnon et al., 2011).

Apart from being obese, the significant surge in the incidence of DM has been attributed largely to modifiable behaviours such as physical inactivity and poor dietary practices (World Health Organization, 2011). While a number of randomized trials have provided evidence that the prevention or delay of DM is, in fact, feasible through lifestyle

modification in high-risk populations (Diabetes Prevention Program Research Group, 2003; Orozco et al., 2008), one recurrent challenge faced by researchers and clinicians alike is translating this evidence into real-world settings in a cost-effective manner (Colagiuri, Vita, & Cardona-Morrell, 2010; Padway & Sharma, 2010). One component of many health promotion programs shown to influence health behaviours, outcomes, and cost is self-management (SM), a concept that connotes an individual taking personal responsibility for his/her day-to-day care over the length of a chronic illness (Brownson, Hoerger, Fisher, & Kilpatrick, 2009; Lorig & Holman, 2003). In the context of DM prevention and obesity, SM can include the integration of three key tasks: (1) behavioural management such as adhering to a medication or specific diet; (2) role management which involves creating and maintaining new meaningful life roles; and (3) emotional management which requires that individuals explore the emotional sequelae associated with the disease and learn to manage these emotions as part of managing the condition (Corbin & Strauss, 1988; Lorig & Holman, 2003).

When integrating these SM tasks within a DM prevention framework, a theoretically-grounded behavioural intervention should be included as a core lifestyle modification component (Colagiuri, Vita, & Cardona-Morrell, 2010). Recent literature suggests that Co-Active Life Coaching (CALC), a theoretically-grounded behaviour change method typically delivered over the telephone (Irwin & Morrow, 2005; Pearson, 2011; Whitworth, Kimsey-House, Kimsey-House, & Sandahl, 2007), is effective for initiating and maintaining new health behaviours over time (Newnham-Kanas, Irwin, & Morrow, 2008, 2011; van Zandvoort, Irwin, & Morrow, 2008, 2009). CALC encompasses and applies the tenets of Motivational Interviewing (MI), a client-centered

counseling style that helps people to explore and resolve their ambivalence for change (Miller & Rollnick, 2002; Newnham-Kanas, Morrow, & Irwin, 2010). The MI applied via-CALC approach (i.e., MI-via-CALC) seeks to forward clients toward personal learning and/or action using specific tools and strategies congruent with the aforementioned tasks and principles of SM including: problem solving, decision making, resource utilization, forming a client-provider partnership, action planning, and self-tailoring (Lorig & Holman, 2003; Whitworth et al., 2007). For details on the MI-via-CALC approach, see Newnham-Kanas et al. (2010) and Article 1.

Among adults with obesity, previous small-scale studies have shown that physical (e.g., decreased weight/waist circumference) and psychological (e.g., increased self-esteem and quality of life) indices are modifiable and respond well to MI-via-CALC (Newnham-Kanas, Irwin, & Morrow, 2008, 2011; van Zandvoort, Irwin, & Morrow, 2008, 2009). University years represent a prime period to transition into life-lasting behaviours. An estimated 25% of Canadians with some post-secondary education are overweight or obese (Perusse-Lachance, Tremblay, & Drapeau, 2010; Statistics Canada, 2006) and many fail to meet national dietary and physical activity recommendations (Perusse-Lachance et al., 2010). Therefore, a marked need for interventions aimed at enabling these students to become healthy adults exists. There is currently a paucity of research aimed at critically evaluating innovative SM-based behaviour change methods among individuals with obesity with a view to reducing risk of developing DM. In light of the severity of these two correlated epidemics, a much needed larger-scale MI-via-CALC-obesity program was developed.

The purpose of the CHANGE (Coaching towards Healthy Actions Naturally through Goal-related Empowerment) Study was to compare two SM approaches. Specifically, we assessed the effectiveness of an interactive 12-week MI-via-CALC program compared to a structured cognitive behavioural-based lifestyle treatment among university students with obesity. The LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) Program for Weight Management (Brownell, 2004), a validated, prescriptive lifestyle-change program, was chosen for the comparison condition. Previous research has demonstrated the efficacy and robustness of LEARN as evidenced by publications in a number of esteemed journals (e.g., The New England Journal of Medicine; Archives of Internal Medicine; Journal of the American Medical Association), its longevity (i.e., new editions of the program have been written approximately every two years), and, as can be found through simple internet searches, its widespread commercial-based applications among health care professionals, weight control clinics, and lay people. Throughout the study and up to six months following completion of the intervention, we assessed the impact of the two treatments on risk factors associated with the development of DM including body composition, blood glucose and lipid profiles, and dietary consumption patterns. To gauge their relative utility further, we explored qualitatively the experiences of the participants enrolled in both treatment conditions as a secondary purpose. Given no MI-via-CALC studies to date have included a comparison condition nor examined these dependent measures simultaneously, no specific hypotheses were made.

Methods

Design

To compare the primary outcome variables between the two treatment conditions over the course of the intervention and during the follow-up period, a parallel group randomized trial design was used. The methods pertaining to the protocol have been described in detail elsewhere (see Article 1); a brief procedural account in relation to the present study is described below.

Participants

Individuals were recruited through flyers (see Appendix C) and e-mail messages for a 12-week health behaviour program integrating MI-via-CALC or a validated lifestyle treatment. Students enrolled at a large urban university and who were between the ages of 18 and 24, with a BMI $\geq$ 30kg/m^2, and free from type 1 diabetes, major medical conditions or diseases were invited to participate. Upon confirming eligibility, participants were randomized to their respective treatment group and a baseline assessment was arranged with the Project Coordinator (ESP). Ethical approval was obtained through the University's research ethics board (see Appendix D) and written informed consent was acquired prior to commencing study involvement (see Appendix F).

Intervention

The MI-via-CALC intervention group received 12 weekly unscripted confidential sessions over the telephone, each one lasting approximately 45 minutes, and delivered by a randomly assigned volunteer Certified Professional Co-Active Life Coach (CPCC) who partnered with the participant for the duration of the intervention. It was the participant's

responsibility to call the coach each week at a pre-arranged time, during which the duo would explore various topics of the participant's choosing and work collaboratively to identify solutions for goal attainment. Dependent on the needs of each participant, the CPCC employed a variety of techniques in accordance with his/her training (e.g., asking meaningful, open-ended questions; being genuinely curious about that participant's life experiences; acknowledging the participant and his/her actions; challenging the participant to attain desired goals).

Participants assigned to The LEARN Program for Weight Management (Brownell, 2004) comparison condition were provided with 12, 30-45 minute scripted lessons over the telephone. The topics involved modifying behaviours and thinking patterns in relation to the principles of lifestyle, exercise, attitudes, relationships, and nutrition via educational content (e.g., planning for and integrating physical activity into daily life; learning the micro/macro nutrient content of commonly consumed foods; and exploring the relationships between caloric intake, expenditure, and weight) and practical applications (e.g., setting goals; overcoming barriers and embracing facilitators to healthy living; enlisting social support; enhancing self-efficacy; and self-monitoring). Each participant worked consistently with his/her randomly assigned LEARN "Specialist" (i.e., a thoroughly trained undergraduate research assistant) who telephoned the participant on a weekly basis at a pre-determined time and delivered the prescriptive lessons in a lecture-style format (i.e., reading the information).

Procedure

Assessments were conducted by the Project Coordinator at baseline (time 1), mid-intervention (i.e., 6-weeks; time 2), post-intervention (i.e., 12-weeks; time 3), and 3- and

6-months following the intervention (i.e., times 4 and 5). Participants completed a 24-hour dietary recall (Middlesex-London Health Unit [MLHU], 2010; see Appendix O) at each time-point, and had their height (time 1 only), weight, and waist circumference measured. Following each assessment (with the exception of time 2), participants were directed to the local hospital lab test centre where a fasting blood glucose and lipid profile were collected (see Appendix P). Finally, an open-ended, semi-structured questionnaire aimed at uncovering participants' experiences in the program was administered at times 3, 4, and 5 (see Appendix R).

Measures

Dietary Intake. A 24-hour dietary recall (MLHU, 2010) was administered to obtain consumption patterns for the day preceding each assessment (collected for weekdays only). Participants were instructed to list everything consumed including meals, beverages, and snacks. Standardized measuring utensils were provided to assist with portion size estimations. Upon completion, participants reviewed the food record with the Project Coordinator or a trained research assistant to confirm the items and add supplementary details wherever necessary. Benefits of this recall format include its cost-effectiveness, low responder/interviewer burden, and the fact that one day has been deemed sufficient to provide a good characterization of a population's average nutrient consumption (Biro, Hulshof, Ovesen, & Cruz, 2002; Posner et al., 1992).

Anthropometry and Physiological Measures. Weight and height were measured using the Tanita BWB-800S Digital Scale and HR-200 Height Rod while waist circumference was assessed following Heart and Stroke Foundation guidelines (Heart and Stroke Foundation, 2011). A fasting blood specimen was collected at times 1, 3, 4, and 5

to capture changes to participant plasma lipid status (i.e., total cholesterol, triglycerides, high-density lipoprotein cholesterol [HDL], and low-density lipoprotein cholesterol [LDL]) and blood glucose levels: all are markers which have been associated with obesity and identified as metabolic risk factors for the development of type 2 diabetes and cardiovascular sequelae (McLaughlin et al., 2003).

Participant Program Experience Questionnaire. A semi-structured questionnaire was administered immediately following the 12-week intervention and at the 3- and 6-month follow-up assessments to capture their experiences in the program. Participants responded to conversational open-ended questions such as: What did you find most/least helpful about being in the study, and why?; The number one thing you got out of the study was?; What types of actions have you taken that you attribute to your specific treatment and involvement in the study (if any)?; What (if anything) is different about how you feel about yourself now since the study ended (i.e. how has your life changed)?

Data Analysis

To calculate participant macro and micro nutrient consumption at each time-point, dietary recall records were entered into a food processor computer program (Food Processor SQL 10.5, ESHA Research Inc., Salem, OR). In accordance with Canada's Food Guide (Health Canada, 2007), the number of vegetable and fruit, grain products, milk and alternatives, and meat and alternative servings were calculated manually. All statistical analyses were conducted using IBM SPSS Statistics, and the principle of intention to treat with the last observation carried forward was applied to account for missing data. The General Linear Model (GLM) with repeated measures was performed to examine differences among the dependent variables over time between the two

treatment conditions and a Bonferroni confidence interval adjustment was applied to compare main effects between the means by time-point. To examine the differences in means between the study groups from pre- to- post intervention, post-intervention to the 6-month follow-up, and from pre-intervention to the 6-month follow-up, residualized change scores were calculated and multiple independent samples *t*-tests were used. Difference scores have been shown to elicit good reliability when individual differences in true change are appreciable (Rogosa & Willett, 1983).

Finally, to explore the programmatic strengths, limitations, and outcomes qualitatively, inductive content analysis (Miller & Crabtree, 1999) was used by three researchers independently to code and categorize the data emanating from the participant program experience questionnaires. In accordance with Lincoln and Guba (1985) several strategies were implemented throughout the analysis to ensure the trustworthiness of the data (i.e., participant quotations to augment credibility, details of processes to support dependability, multiple-coders to enhance confirmability, and participant demographics to heighten potential transferability).

Results

Seventy-eight individuals were enrolled in the CHANGE Program and participated in a baseline assessment. To examine the impact of the two treatment conditions on the dependent variables of participants over time, only those who completed their respective intervention and at least one of the follow-up assessments were included in the present study ($n = 45$). To test for group equivalency at baseline, univariate ANOVAs were conducted on the demographic characteristics and primary outcomes measures revealing no significant differences between the MI-via-CALC ($n =$

25) and LEARN (n = 20) groups (Table 1). Among the 33 young adults who did not complete the program, scheduling conflicts (n = 7), lack of treatment fit (n = 12), and personal issues (n = 4) were cited most often as reasons for withdrawal while the remaining decisions were unknown (n = 10). Additional demographic details pertaining to non-completers are reported elsewhere (see Article 3).

Anthropometric and Physiological Profiles. To capture changes to participant anthropometrics over the course of the intervention and follow-up period by treatment group, repeated measures ANOVAs were conducted revealing a significant time effect for body weight [$F(4,40) = 3.76$, $p = .01$, $\eta^2 = .27$]. Post hoc analysis using a Bonferroni confidence interval adjustment indicated that these changes occurred specifically between times 1 and 2 ($p < .05$), 1 and 3 ($p < .01$), and 1 and 4 ($p < .05$), while a trend towards significance was observed between times 1 and 5 ($p = .06$). To examine further the differences in weight between groups for times 1-3, 1-5, and 3-5, independent samples t-tests using change score values were calculated. On average, participants in the LEARN group decreased their total weight more (M = -7.76, SE = 2.05) than those in the MI-via-CALC group (M = -2.5, SE = 1.70) between baseline and week 12. This difference was significant $t(43) = -1.98$, $p = .05$, and represented a medium-sized effect, $r = .29$. Although no effects were observed for waist circumference, post hoc analyses indicated a trend towards significance between times 1 and 3 ($p = .07$).

To examine participant plasma lipid status (i.e., total cholesterol, triglycerides, HDL, and LDL) and blood glucose level changes by group, repeated measures ANOVAs were conducted revealing a significant time effect for cholesterol [$F(3,39) = 2.73$, $p = .05$, $\eta^2 = .17$] and HDL [$F(3,39) = 3.71$, $p = .01$, $\eta^2 = .22$]. Post hoc analyses showed that

changes occurred specifically between times 1 and 3 (p = .01), and 1 and 4 (p = .05) for HDL. While a between group interaction approaching significance was found for LDL [$F(1,41) = 3.78$, p = .06, η^2 = .08], this should be interpreted with caution as a univariate analysis of variance revealed a trend towards significance for the mean baseline values (p = .08).

Dietary Intake. For dietary intake, repeated measures ANOVAs showed a significant time effect between times 1 and 5 for: total calories [$F(4,40) = 3.08$, $p < .05$, η^2 = .24]; and calories from carbohydrates [$F(4,40) = 3.76$, p = .01, η^2 = .27]; a trend towards significance for calories from protein was also observed [$F(4,40) = 2.44$, p = .06, η^2 = .20]. Post hoc analyses revealed that changes occurred specifically between times 1 and 3 for total calories and calories from carbohydrates ($p < .05$) and between the times 4 and 5 for calories from protein ($p < .05$). To examine further the differences between groups for these variables in addition to calories from fat for times 1-3, 1-5, and 3-5, independent samples *t*-tests using change score values were calculated. On average, participants in the MI-via-CALC group decreased their total calories consumed to a greater degree (M = -662.76, SE = 167.42) than those in the LEARN group (M = -105.5, SE = 180.03) between times 1 and 3 (see Figure 1). This difference was significant $t(43) = 2.26$, $p < .05$, and represented a medium-sized effect, r = .32. For calories from fat, participants in the MI-via-CALC group decreased their average consumption more (M = -319.6, SE = 95.58) than the LEARN group (M = 15.3, SE = 88.06) between times 1 and 3, a difference which was significant $t(43) = 2.52$, p = .01 and represented a medium effect size, r = .36. Table 2 contains descriptive statistics for all dietary variables by time-point.

Participant Program Experience Questionnaire. The social support provided by the CPCC was reported as especially helpful by most MI-via-CALC participants. Many commented that the weekly interaction was motivating and facilitated personal accountability for decision-making, while also enhancing self-confidence and awareness. Four found the lack of instruction frustrating and thus the treatment fit unsuitable. LEARN participants found the information on nutrition particularly beneficial in combination with specific strategies (e.g., goal setting, calorie counting) and tools (e.g., self-monitoring) for making behavioural changes. The lack of interactivity and the desire for a more personally tailored program were deemed least helpful. Participants in both treatments reported eating healthier and exercising more since starting the program, and while the MI-via-CALC group focused on self-understanding, -reflection, and -responsibility as primary outcomes of their experience, the LEARN group stressed their appreciation of practical lifestyle tips and knowledge gained. Typical quotes pertaining to participant experiences by group are in Table 3.

Table 1. Participant demographics and primary outcome measures by time-point (n = 45)

	Baseline (Time 1)		6 week (Time 2)		12 week (Time 3)		3 month (Time 4)		6 month (Time 5)	
Variable	M*	L	M	L	M	L	M	L	M	L
Age (year)	20.5 (1.7)[1]	21.4 (1.8)	-	-	-	-	-	-	-	-
Sex										
Women	21	13	-	-	-	-	-	-	-	-
Men	4	7	-	-	-	-	-	-	-	-
Height (in)	66.5 (3.5)	66.7 (3.2)	-	-	-	-	-	-	-	-
Weight (lb)	221.7 (36.8)	220.7 (32.6)	220.3 (38.8)	216.8 (31.3)	219.1 (40.8)	212.9 (29.5)	218.2 (39.7)	212.7 (28.6)	216.4 (39.1)	212.6 (28.6)
Waist circumference (in)	44.1 (4.1)	43.7 (4.2)	43.9 (4.2)	43.2 (3.9)	43.6 (4.5)	42.7 (4.0)	43.2 (4.9)	43.0 (3.8)	43.6 (5.0)	42.9 (4.1)
Blood (mmol/L)[2]										
Fasting glucose	4.83 (.4)	4.91 (.3)	-	-	4.77 (.5)	4.83 (.3)	4.86 (.5)	4.76 (.2)	4.81 (.4)	4.73 (.3)
Triglycerides	1.36 (.6)	1.19 (.6)	-	-	1.26 (.6)	1.18 (.6)	1.26 (.6)	1.21 (.6)	1.19 (.5)	1.19 (.6)
Total cholesterol	4.29 (.6)	4.38 (.8)	-	-	4.03 (.7)	4.32 (1)	4.09 (.7)	4.50 (.9)	4.13 (.7)	4.34 (1)
HDL	1.38 (.4)	1.27 (.3)	-	-	1.23 (.4)	1.21 (.3)	1.25 (.4)	1.24 (.3)	1.28 (.4)	1.22 (.3)
LDL	2.25 (.6)	2.60 (.7)	-	-	2.18 (.6)	2.58 (.8)	2.21 (.6)	2.69 (.7)	2.25 (.6)	2.59 (.8)
Cholesterol:HDL	3.31 (.8)	3.43 (.8)	-	-	3.61 (1.2)	3.53 (.7)	3.59 (1.2)	3.55 (.7)	3.55 (1.1)	3.51 (.8)

*M = MI-via-CALC Condition (n = 25); L = LEARN Condition (n = 20); [1]Mean (± standard deviation) unless indicated otherwise; [2]M (n = 23)

Table 2. Participant dietary intake by time-point (n = 45)

	Baseline (Time 1)		6 week (Time 2)		12 week (Time 3)		3 month (Time 4)		6 month (Time 5)	
Variable	M	L	M	L	M	L	M	L	M	L
Total calories	2279.0 (858.1)	2050.3 (776.4)	1946.8 (836.2)	2017.0 (792.3)	1616.3 (670.8)	1940.9 (914.1)	1770.6 (606.0)	1775.5 (965.2)	1849.7 (721.5)	1869.3 (727.2)
Calories from carbohydrates	1177.8 (403.8)	1064.8 (452.7)	1039.2 (495.1)	1090.6 (495.08)	894.6 (416.6)	937.2 (422.0)	874.3 (386.7)	980.2 (767.3)	971.2 (469.9)	1016.2 (529.1)
Calories from protein	333.5 (166.1)	328.4 (143.4)	327.4 (144.6)	327.4 (139.0)	281.9 (114.9)	337.4 (137.7)	301.1 (125.1)	290.2 (143.2)	355.0 (168.0)	397.0 (177.1)
Calories from fat	787.2 (523.2)	653.4 (342.5)	579.6 (334.2)	585.9 (269.2)	467.3 (238.8)	668.7 (442.7)	550.2 (308.6)	512.7 (268.8)	610.6 (437.1)	573.6 (190.1)
Saturated Fat (g)	32.9 (31.4)	25.5 (14.9)	23.7 (15.9)	21.9 (15.5)	19.6 (14.4)	25.0 (19.4)	21.3 (14.8)	20.1 (12.1)	26.0 (23.8)	22.0 (11.0)
Cholesterol (g)	311.5 (256.4)	270.5 (189.6)	273.4 (208.4)	210.3 (159.2)	214.0 (172.8)	218.2 (137.9)	257.8 (219.5)	169.6 (120.3)	259.7 (254.2)	279.0 (204.2)
Fibre (g)	20.7 (8.8)	19.4 (9.9)	21.8 (14.6)	22.0 (12.4)	19.7 (10.4)	19.3 (8.1)	21.3 (10.6)	19.7 (11.2)	17.9 (7.4)	20.3 (9.9)
Calcium (mg)	1047.3 (1062.2)	814.1 (377.8)	983.5 (509.2)	888.1 (414.8)	854.6 (745.9)	882.6 (494.6)	746.6 (251.5)	727.2 (429.8)	809.3 (410.3)	815.1 (431.6)
Sodium (mg)	3458.4 (1693.3)	3361.4 (1753.2)	3158.5 (1558.7)	3621.7 (2097.1)	2788.2 (1658.2)	3490.2 (1895.7)	2909.1 (1161.4)	3066.8 (1407.1)	2801.8 (1320.8)	3231.7 (1898.3)
Caffeine (mg)	71.4 (104.5)	106.5 (100.2)	65.5 (82.6)	113.7 (114.3)	83.7 (142.6)	139.6 (166.6)	56.7 (76.1)	91.8 (85.2)	68.2 (82.2)	129.6 (140.5)
Food Group Servings										
Milk & Alternatives	1.52 (1.47)	1.02 (1.14)	1.48 (1.34)	1.71 (1.20)	1.33 (1.74)	1.40 (1.32)	1.31 (1.10)	1.01 (1.11)	1.55 (1.35)	1.23 (1.36)
Meat & Alternatives	2.44 (1.58)	2.37 (1.55)	2.08 (1.60)	2.77 (2.27)	2.06 (1.58)	2.43 (1.52)	2.51 (1.99)	2.41 (1.53)	2.16 (1.88)	2.37 (1.54)
Grain Products	6.40 (2.79)	5.68 (3.51)	5.10 (2.88)	5.98 (2.99)	4.40 (1.98)	4.96 (2.65)	5.15 (1.93)	5.05 (2.61)	5.07 (3.57)	5.61 (2.70)
Vegetables & Fruit	4.51 (2.71)	4.26 (2.80)	4.58 (3.65)	4.86 (4.11)	5.18 (3.32)	4.42 (2.45)	5.35 (3.94)	6.01 (4.52)	4.14 (2.23)	4.06 (3.51)

Figure 1. Means for total calories consumed by group over time

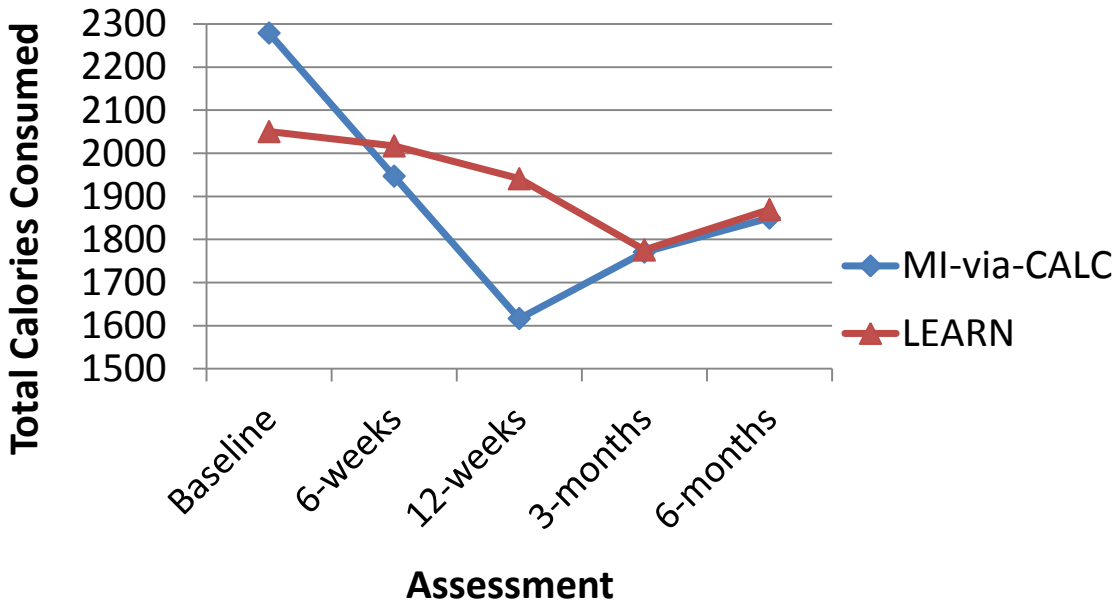


Table 3. Participant perspectives on program involvement

What did you find <u>most</u> helpful about the study and why? Time 3 assessment **MI-via-CALC** "Just being able to talk to someone who really listened and made sense of some of the jumbled thoughts in my head; kept me/got me back on track." "Coaching made me reflect on what my obstacles were and on what I could do to help myself – it was motivational in a sense." "Regular check-ins that made me feel accountable for my actions and decisions." "[H]aving someone believe in me and give [me] the confidence to make even little changes." **LEARN** "The dietary and calorie information because it made me realize I could be healthy, lose weight and still enjoy food – it is not a struggle anymore." "Recording food intake (calories) made me a lot more aware of what I was actually eating." "[The]focus [was] on health and not just weight loss. Concept that every little bit counts and that it is possible to be in control." "Small changes in your lifestyle make a big difference to losing weight. It makes losing weight seem more possible."
What did you find <u>least</u> helpful about the study and why? Time 3 assessment **MI-via-CALC** "Unclear about what was to be discussed with coach." "I found that a coach is probably not the greatest plan for me." "The group I was placed in didn't motivate or make clear ways to lose weight. My goals changed because of this. I needed clear direction but it was up to me to figure out how to do so. Made things difficult and frustrating at times…" **LEARN** "The study was based on an introductory level and I feel it was not useful for anyone who already has the knowledge and intro base of weight loss." "Lack of interactivity. I felt less compelled to follow through…" "Many things did not apply to me and many things I could not comply with." "The method of the calls was more lecture style and it would have been nice if it was more interactive." "No real personal contact/connection with specialist. i.e. Felt like it was a set program for everyone and not tailored to me."
The number one thing that you got out of the study was… Time 3 assessment **MI-via-CALC** "Awareness of myself, my challenges and how I can make my life a richer and more meaningful experience." "Learning to be more reflective of my daily choices and taking responsibility for the changes I need to make." "Creating new ways to be successful when I find that something isn't working for me." "The confidence in myself to know that I can successfully make healthy changes in my life." "Realizing that only I can make my own changes." "Learning to understand myself and the reasons behind my thoughts and actions." **LEARN** "I never paid any attention to calories whatsoever before. Once I understood what they were, how much I should have, and how much calories certain foods contain, I have definitely permanently changed my eating habits." "Learning to think positively and not put myself down, integrating healthy habits into everyday life (e.g. being sensitive to portions, wearing a pedometer)."

"Small tips that could be applied to every day routine (e.g. Be conscious of # of bites; where you sit when you eat; substituting something for carbs, taking stairs when you can etc.)."
What types of actions have you taken that you attribute to your specific treatment and involvement in the study (if any)? 4 = Time 4 assessment; 5 = Time 5 assessment **MI-via-CALC** "… [P]utting my own needs before the needs of others more often…" – 4…. "Stress management techniques that I discussed with my life coach; seeking out weight management programs/techniques research as a result of motivation provided by program/treatment." – 4 "I think I assert myself more – I have more confidence. I am more comfortable with myself." – 4 "Watch what I am eating (portion size) and trying hard to fit exercise into my day." – 4 "I cut down on eating unhealthy, premade foods [and] began cooking for myself [and] making healthy decisions; I learned how to motivate myself to exercise; I've learned to fight temptations." – 4 "More attention and credit given to myself even when only achieving very small things." – 4 "I still use methods of relaxation and motivation that my life coach suggested. I feel more confident in going to the gym and working out in general." – 5 "Taking a different daily outlook; seeing myself in many different ways." – 5 "Making conscious decisions regarding the types of foods I buy and eat. Paying attention to calorie, protein, sugar, fibre content in the food I eat." – 5 "I've learned how to motivate myself to exercise. I've also learned healthy eating habits and that I have the power to limit unhealthy foods." – 5 **LEARN** "I always make sure I walk for at least an hour each day. Before the study I had absolutely no physical activity and now I have to go out on walks to feel good." – 4 "I am more mindful of portion sizes and try to maintain a calorie deficit each day. I'm more active – not just going to the gym but taking the stairs or walking instead of taking the bus." – 4 "Writing down what I eat when I feel my habits are getting out of control; eating slow and in a designated place (i.e., Kitchen table)." – 4 "I have been making my weight-health more of a priority …." – 5 "Feeling good about walking for short periods of time when not having enough time for a full workout routine. Doing extra little things like walking the last bus stop or taking the stairs instead of the escalator." – 5 "Joined a gym, walking to/from work instead of taking the bus, eating healthier foods." – 5 "Making time for preparing healthier meals; making an effort to move (bike, walk, climb stairs etc.) even for 15 minutes a day." – 5
What (if anything) is different about how you feel about yourself now since the study ended (i.e., how has your life changed)? 4 = Time 4 assessment; 5 = Time 5 assessment **MI-via-CALC** "I've learned to take responsibility for my choices and feel more in control of my food and exercise regimen." – 4 "I feel I have more knowledge and information to apply my attempts for lifestyle change. I am also more confident in decision-making both related to diet and exercise and other aspects of my life." – 4 "I definitely feel better about my body and happier with who I am. I can control my emotions more and I am able to talk to people close to me about feelings and emotional issues." – 4 "I now feel as if I have the power to make changes in my lifestyle which can allow me to easily achieve the results I want to see. I have recently noticed that I have dropped a dress size and that to me is more important than what the scale says…Not being the biggest size anymore has raised my confidence while shopping tremendously." – 4 "I am much more aware of the challenges I need to overcome to achieve my health goals. I don't

ignore health issues anymore." – 5
"I feel much more independent and capable. Also, I realize how well-equipped I am to succeed." – 5
"I feel better about myself and the way I look. I want to continue to lose weight, even though it takes me a longer time. I appreciate my body more now than I did before." – 5
"I feel more confident that if I want to make a change I am in control of my own body." – 5
LEARN
"I feel more knowledgeable about the issue at hand." – 4
"I do feel a little more confidence in my appearance now that I feel better, I dress better to match. I am not as disgusted by my body as before. I realize it is a lot easier than I initially assumed to make changes in my life and lose weight." – 4
"I have lots of energy and I'm very proud of the weight I've lost." – 4
"I have lost more weight so I have become a lot more confident in my ability to reach my goals." – 4
"I learned how to like myself regardless of my progress in the program, and I've also learned how to keep myself upbeat and positive whenever I don't quickly succeed. I've learned patience with myself." – 4
"More empowered to make healthy choices." – 4
"I have finally dropped my weight below 200lbs, which was a big milestone for me. Being under this mark has made a big emotional difference for me, knowing I am under this red line I have drawn for myself makes me feel confident that I can continue losing weight healthily and successfully." – 5
"I've felt more confident, I've gained some more self-esteem and I've also gained more confidence in clothes and food choices." – 5
"More confident that I can make a long term change; better educated on what makes a healthy lifestyle." – 5

Discussion

The purpose of the present study was to compare the effectiveness of two SM approaches delivered via a 12-week telephone-based intervention on risk factors associated with the development of DM among university students with obesity. Overall, positive changes to anthropometric (i.e., weight loss), physiological (i.e., total cholesterol), and dietary profiles (i.e., total calories) were observed across the MI-via-CALC and LEARN conditions between baseline and the six-month follow-up period. These findings suggest that participants were receptive to each condition, one interactive and the other prescriptive. Consequently, it appears that both interventions should be made available and even merged on a case-by-case basis for young adults struggling with their weight. It is important to note that while both arms seem similarly effective, they appear to address different challenges associated with obesity treatment: MI-via-CALC focusing on the underlying relationship with one's self, and LEARN, the more practical "how to" aspects of weight loss and behaviour change. Thus, the personal preferences, needs, and differential learning styles of individuals must be considered. Also, these findings extend those arising from previous research examining the utility of MI-via-CALC and LEARN as viable obesity treatments (e.g., Article 3; Newnham-Kanas et al., 2011; Womble et al., 2004), thereby providing preliminary empirical evidence for their application with respect to DM risk. According to Corbin and Strauss (1988), programs aimed at managing chronic conditions must incorporate content that addresses SM tasks pertaining to behavioural, role, and emotional management. One criticism of many health promotion and patient education programs is that they often address the first SM task but fail to consider the remaining two (Lorig & Holman, 2003). From a SM

perspective, we believe that the CHANGE Program offers a comprehensive approach to obesity treatment and DM risk through the inclusion of two interventions that are congruent with all three management tasks while simultaneously incorporating many elements necessary to attenuate health risks in this population.

Weight loss is an important therapeutic strategy for individuals with obesity who are at risk for developing DM (Klein et al., 2004). Irrespective of group allocation, analyses revealed consistent decreases to weight among participants across the five time-points. Notably, individuals assigned to the LEARN group lost significantly more weight (i.e., 7.76 lbs) than their MI-via-CALC counterparts (i.e., 2.5 lbs) during the first 12-weeks of the program. While this five pound difference in weight loss may not be considered a clinically substantial finding given the mean starting weights of each group it is, none-the-less, statistically significant. One key skill of SM is decision-making which requires that an individual have the appropriate knowledge necessary to make behavioural changes (Lorig & Holman, 2003). Analogous with the qualitative feedback received, it is possible that this group difference was attributable to the didactic information and practical tips provided through the LEARN program lessons. Moreover, this information may have contributed towards satisfying the dimensions of behavioural (e.g., adhering to new portion control practices; stopping a medication required previously) and role management (e.g., integrating and identifying more with physical activity; shopping differently) among those assigned to this condition. This highlights the importance of education.

Given the well-recognized role that cholesterol plays in developing cardiovascular disease, not to mention the inverse correlation between cardiac-related mortality and

improvements in controlling cholesterol (Genest et al., 2009), it is promising that a significant time effect was observed for this variable across participants in the present study. While this change cannot be attributed to a specific causal mechanism or treatment, the downward trend may be indicative of participants integrating a SM skill referred to as "taking action" (Lorig & Holman, 200315); the latter involves creating and carrying out a short-term, realistic action plan for a particular behaviour (e.g., dietary or physical activity changes). For example, in MI-via-CALC this skill is congruent with balance coaching, a specific style of coaching which involves: (a) working with a client/patient collaboratively to uncover new perspectives/ways of viewing a barrier or life event; (b) brainstorming possible solutions using a new way of viewing the situation; (c) creating a plan of action; and (d) following through (Whitworth et al., 2007). The glucose levels and remaining lipid values presented in the normative reference ranges (Genest et al., 2009) at the time-points examined suggesting that the participants may have been too heterogeneous to capture salient trends or were too small in number, or a longer intervention is required to elicit significant changes in these domains. Additional research is warranted to clarify further, the link between these physiological markers and DM risk in this context.

Findings for dietary intake revealed that the MI-via-CALC group decreased their total calories consumed significantly more than the LEARN group between times 1 and 3; the majority of this difference was attributed to reductions in fat versus carbohydrate or protein-based calories. While the current study does not lend itself to determining a causal explanation as to why this may have been the case, it is an interesting finding given the agenda of each MI-via-CALC session is determined entirely by the participant/

client and may or may not involve direct obesity-related, topical issues (Miller & Rollnick, 2002; Whitworth et al., 2007). Psychological support has been recommended as an important complement to weight-loss programs to attenuate distress that could be incurred as a result of behavioural changes (Fabricatore & Wadden, 2003). From a SM perspective, focusing on the issues brought forth by the participant (and not imposed by the coach/provider) is imperative for addressing and managing the emotional outcomes that can accompany excess weight while facilitating the integration of personally relevant coping strategies (van Zandvoort et al., 2009; Whitworth et al., 2007). During the qualitative feedback, many participants in the MI-via-CALC group described an internal shift in their relationship with themselves, a shift that involved greater self-acceptance, -awareness, -responsibility, and -confidence, and living a healthier lifestyle as a result of study involvement and working with a CPCC. It is possible that the observed decreases in caloric consumption were impacted by this relationship shift. In accordance with research conducted previously (Newnham-Kanas et al., 2008; van Zandvoort et al., 2009), these findings highlight the utility of MI-via -CALC as an innovative support technique for individuals with obesity.

Limitations and Future Directions. One limitation of the present study includes its smaller than ideal sample size. In addition, the reliance on self-report data for dietary intake may have resulted in under-estimations and/or recall bias. Also, the study was not designed to assess the relative contributions of specific programmatic components towards changes in the dependent variables examined. Given the multi-faceted nature of each treatment, this is an important consideration for future research. In spite of these limitations, one strength of the present study is its delivery modality. When administered

over the telephone, this program represents an accessible, convenient treatment with the potential to provide substantial reach in a cost-effective manner (see Article 3). In light of the mosaic of areas in participants' lives affecting obesity and vice versa, future programs should explore this format further via a longer and more intensive intervention (lasting for at least a year) with a view towards eliciting long-lasting changes to an even greater degree (Newnham-Kanas et al., 2011).

In conclusion, MI-via-CALC and the LEARN Program appear similarly effective suggesting that both interventions hold promise and are warranted as viable SM treatments for attenuating DM risk factors among young adults with obesity. While the LEARN program provides integral knowledge, strategies, and tips congruent with behavioural and role SM, MI-via-CALC facilitates emotional management through personal reflection and self-exploration. Based on the differential responses to both treatments observed in the present study, future programs should consider the unique contributions of each when working collaboratively with an individual to design a treatment plan congruent with his/her values, aspirations, and goals (Whitworth et al., 2007). The inclusion of participants/clients into the best-fit treatment program may prove to be an essential first step towards instilling the SM tenets of choice and empowerment necessary to incur long-lasting behavioural change in this at-risk population.

References

Almdal, T., Scharling, H., Jensen, J., & Vestergaard, H. (2004). The independent effect of type 2 diabetes mellitus on ischemic heart disease, stroke, and death: A population-based study of 13000 men and women with 20 years of follow-up. *Archives of Internal Medicine, 164,* 1422-1426.

Birmingham C. L., Muller J. L., Palepu A., Spinelli, J. J., & Anis, A. H. (1999). The cost of obesity in Canada. *Canadian Medical Association Journal, 160,* 483-488.

Biro, G., Hulshof, K. F. A. M., Ovesen, L., & Cruz, J. A. A. (2002). Selection of methodology to assess food intake. *European Journal of Clinical Nutrition, 56,* S25-32.

Brownell, K. D. (2004). *The LEARN Program for Weight Management (10th ed.).* Dallas, TX: American Health Publishing.

Brownson, C. A., Hoerger, T. J., Fisher, E. B., & Kilpatrick, K. E. (2009). Cost-effectiveness of diabetes self-management programs in community primary care settings. *The Diabetes Educator, 35,*761-769.

Canadian Diabetes Association. (2012). *Diabetes and you. Fact sheet*. Retrieved from http://www.diabetes.ca/ diabetes-and-you/what/facts/

Centers for Disease Control and Prevention. (2011). *National diabetes fact sheet: National estimates and general information on diabetes and prediabetes in the United States,* 2011. Retrieved from http://www.cdc.gov/diabetes/pubs/ factsheet11.htm

Colagiuri, S., Vita, P., & Cardona-Morrell, M. (2010). The Sydney diabetes prevention program: A community-based translation study. *BMC Public Health, 10,* 328.

Corbin, J., & Strauss, A. (1988). *Unending work and care: Managing chronic illness at home*. San Francisco, CA: Jossey-Bass.

Diabetes Prevention Program Research Group. (2003). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine, 346,* 393–403.

Fabricatore, A. N., & Wadden, T. A. (2003). Psychological functioning of obese individuals. *Diabetes Spectrum, 16,* 245-252.

Gagnon, C., Brown, C., Couture, C., Kamga-Ngande, C. N., Hivert, M. F., Baillargeon, J. P., ... Langlois, M. F. (2011). A cost-effective moderate-intensity interdisciplinary weight-management programme for individuals with prediabetes. *Diabetes and Metabolism, 37,* 410-418.

Genest, J., McPherson, R., Frohlich, J., Anderson, T., Campbell, N., Carpentier, A., ...Ur, E. (2009). 2009 Canadian cardiovascular society/Canadian guidelines for the diagnosis and treatment of dyslipidemia and prevention of cardiovascular disease in the adult – 2009 recommendations. *Canadian Journal of Caridiology, 25,* 567-579.

Health Canada (2007). *Eating well with Canada's food guide*. H164-38/1-2007E. 2007. Ottawa ON, Health Canada.

Heart and Stroke Foundation. (2011). *Healthy waists*. Retrieved from http://www.heartandstroke.on.ca /site/c.pvI3IeNWJwE/b.4018281/k.8698/ Healthy_Waists.htm.

Irwin, J. D., Morrow, D. (2005). Health promotion theory in practice: An analysis of Co-

Active coaching. *International Journal of Evidence Based Coaching and Mentoring, 3,* 29-38.

Klein, S., Sheard, N. F., Pi-Sunyer, X., Daly, A., Wylie-Rosett, J., Kulkarni, K., & Clark, N. G. (2004). Weight management through lifestyle modification for the prevention and management of type 2 diabetes: Rationale and strategies. *Diabetes Care, 27,* 2067-2073.

Lew E. A., & Garfinkel, L. (1979). Variations in mortality by weight among 750,000 men and women. *Journal of Chronic Diseases, 32,* 563-576.

Lincoln, Y. S., & Guba, E. G. (1985). Establishing trustworthiness. In: *Naturalistic inquiry* (pp. 289-331). Newbury Park, CA: Sage.

Lorig, K. R., & Holman, H. R. (2003). Self-management education: History, definition, outcomes, and mechanisms. *Annals of Behavioral Medicine, 26,* 1-7.

McLaughlin, T., Abbasi, F., Cheal, K., Chu, J., Lamendola, C., & Reaven, G. (2003). Use of metabolic markers to identify overweight individuals who are insulin resistant. *Annals of Internal Medicine, 139,* 802-809.

Middlesex-London Health Unit . (2010). *One-day Food Record.* Chronic Disease and Injury Prevention Team. London, ON.

Miller, W. L., & Crabtree, B. F. (1999). Clinical research: A multimethod typology and qualitative roadmap. In: B. F. Crabtree, & W. L. Miller (Eds.), *Doing Qualitative Research*, 2nd ed. (pp. 3-30). Thousand Oaks, CA: Sage.

Miller, W. R., & Rollnick, S. (2002). *Motivational Interviewing: Preparing people for change (2nd ed.).* New York, NY: The Guildford Press.

Must, A., Spandano, J., Coakley, E. H., Field, A. E., Colditz, G., & Dietz, W. H. (1999).

The disease burden associated with overweight and obesity. *Journal of the American Medical Association, 282,* 1523-1529.

Newnham-Kanas, C. E., Irwin, J. D., & Morrow, D. (2008). Co-Active life coaching as a treatment for people with obesity. *International Journal of Evidence Based Coaching and Mentoring, 6,* 1-12.

Newnham-Kanas, C., Irwin, J. D., Morrow, D., & Battram, D. (2011). The quantitative assessment of Motivational Interviewing using Co-Active life coaching skills as a treatment for adults struggling with obesity. *International Coaching Psychology Review, 6,* 211-225.

Newnham-Kanas, C., Morrow, D., & Irwin, J. D. (2010). Motivational coaching: A functional juxtaposition of three methods for health behaviour change: Motivational interviewing, coaching, and skilled helping. *International Journal of Evidence Based Coaching and Mentoring, 8,* 27-48.

Orozco, L. J., Buchleitner, A. M., Ginenez-Perez, G., Roque I Figuls, M., Richter, B., & Mauricio, D. (2008). Exercise or exercise and diet for preventing type 2 diabetes mellitus. *Cochrane Database Syst Rev* 2008, 3. Art. No.: CD003054. DOI: 10.1002/14651858.CD003054.pub3.

Padwal, R. S., & Sharma, A. M. (2010). Prevention of cardiovascular disease: Obesity, diabetes, and the metabolic syndrome. *Canadian Journal of Cardiology, 26,* 18-20.

Pearson, E. (2011). The 'how to' of health behaviour change brought to life: A

theoretical analysis of the Co-Active coaching model and its underpinnings in self-determination theory. *Coaching: An International Journal of Theory, Research, and Practice, 4,* 89-103.

Perusse-Lachance, E., Tremblay, A., & Drapeau, V. (2010). Lifestyle factors and other health measures in a Canadian university community. *Applied Physiology, Nutrition, and Metabolism, 35,* 498-506.

Posner, B. M., Martin-Munley, S. S., Smigelski, C., Cupples, L. A., Cobb, J. L., Schaefer, E., … D'Agostino, R. B. (1992). Comparison of techniques for estimating nutrient intake: The Framingham study. *Epidemiology, 3,* 171-177.

Public Health Agency of Canada (2011). *Obesity in Canada. A joint report from the Public Health Agency of Canada and the Canadian Institute for Health Information.* Cat.: HP5-107/2011E-PDF

Rogosa, D. R., Willett, J. B. (1983). Demonstrating the reliability of the difference score in the measurement of change. *Journal of Educational Measurement, 20,* 335-353.

Shields, M., Carroll, M. D., & Ogden, C. L. (2011). *Adult obesity prevalence in Canada and the United States* (Data Brief No. 56). Retrieved from National Center for Health Statistics website: http://www.cdc.gov/nchs/data/databriefs/db56.htm

Statistics Canada. (August, 2006a). *Health Reports* (Catalogue no. 82-003-XPE, 17(3)). Ottawa, Ontario, Canada: Health Statistics Division.

van Zandvoort, M., Irwin, J. D., & Morrow, D. (2008). Co-Active coaching as an intervention for obesity among female university students. *International Coaching Psychology Review, 3,* 191-206.

van Zandvoort, M., Irwin, J. D., & Morrow, D. (2009). The impact of Co-active life coaching on female university students with obesity. *International Journal of Evidence Based Coaching and Mentoring, 7,* 104-118.

Whitworth, L., Kimsey-House, K., Kimsey-House, H., Sandahl, P. (2007). *Co-Active coaching: New skills for coaching people toward success in work and life* (2nd ed.). California: Davies-Black Publishing.

Womble, L. G., Wadden, T. A., McGuckin, B. G., Sargent, S. L., Rothman, R. A., & Krauthamer-Ewing, E. S. (2004). A randomized controlled trial of a commercial Internet weight loss program. *Obesity Research, 12,*1011-1018.

World Health Organization. (2011). *Diabetes fact sheet.* Retrieved from http://www.int/mediacentre/factsheets/ fs312/en/index.html.

Summary, Conclusions, and Future Directions

Summary

In this dissertation, the effectiveness of MI-via-CALC was assessed as a behavioural obesity intervention using a validated comparison condition, the LEARN Program for Weight Management, among university students. Four distinct articles were written to provide insight into: (a) the study rationale with a focus on the methodological underpinnings of the CHANGE Program; (b) the utility of goal setting as a health behaviour change strategy among adults with overweight and obesity in community settings; (c) the impact of the program on psycho-social dimensions including quality of life and self-esteem, as well as their relationships to changes in weight; and (d) the impact of the two interventions on physiological variables associated with the development of type 2 diabetes (i.e., blood lipid and glucose profiles, anthropometric measures, and dietary intake) in addition to participant experiences of program involvement.

Article 1 provided a comprehensive methodological account of the CHANGE Program which included a detailed rationale for its development, its relationship to goal setting, and a comprehensive description of the interventions and methods used. Given that this project is the first of its kind, that is, a large-scale study examining the impact of MI-via-CALC in this at-risk population, it is hoped that this information will be utilized to inform the development of such future population-based approaches.

Article 2 explored systematically the goal setting intervention components used for behaviour change specific to diet and physical activity in community-based settings between 1977 and 2009. Eighteen studies were evaluated using the START criteria which were developed for the purposes of the review in service of uncovering features

that elicited optimal health-related outcomes. As a result of their application, it was determined that setting specific goals in close proximity with a desired distal outcome, that involve the participant in acquisition, and incorporate regular feedback, are common features in this context and could contribute, in part, to eliciting positive health behaviour changes. Educating participants and including a self-monitoring component also appear to be important considerations when addressing overweight and obesity-related behaviours and developing treatment plans aimed at this population. Results were considered throughout the implementation phase and used to inform the evaluation and critical discussion regarding the CHANGE Program.

The purpose of Article 3 was to compare the impact of MI-via-CALC with the LEARN Program on the quality of life and self-esteem of participants during a 12-week telephone-based intervention, and three- and six-months following its completion. Significant improvements to both dimensions were observed across the groups between baseline and follow-up periods indicating that: a) both are effective at eliciting positive changes to QOL dimensions and SE in young adults with obesity; b) MI-via-CALC appears to be on par with LEARN, a well-validated lifestyle modification program, as a viable obesity treatment that helps to facilitate sustainable change; and c) to meet the expectations of treatment-seeking young adults with obesity, both treatments need to be made available, and in some cases merged, based on the differential learning styles and needs of each individual. Significant changes to SE were observed between weeks 6 and 12 of the CHANGE Program and improvements were unrelated to the weight loss experienced among participants; this suggests that the short-and long-term impact of weight loss treatment on SE is likely moderated by other variables such as appearance-

related changes, or participating in the actual treatment itself (Blaine et al., 2007; Foster & Matz, 2002; Foster et al., 1997; Martin & Lichtenberger, 2002).

Article 4 compared the effectiveness of the two interventions from a self-management perspective throughout the study and up to six-months following completion of the intervention. Considering the parallel epidemics of obesity and DM, risk factors associated with the development of DM including body composition, blood glucose and lipid profiles, and dietary consumption patterns were assessed. To gauge their relative utility further, we explored qualitatively the experiences of the participants enrolled in both treatment conditions as a secondary purpose. Overall, positive changes to anthropometric (i.e., weight loss), physiological (i.e., total cholesterol), and dietary profiles (i.e., total calories) were observed across the MI-via-CALC and LEARN conditions between baseline and the six-month follow-up period. Qualitatively, the social support provided by the CPCC was reported as especially helpful by most MI-via-CALC participants. The weekly interaction was identified as motivating and facilitated personal accountability for decision-making, while also enhancing self-confidence and awareness. LEARN participants found the information on nutrition and provision of practical tips and strategies particularly beneficial for making behavioural changes. Participants in both treatments reported eating healthier and exercising more since starting the program. These findings suggest that participants were receptive to each condition, one interactive and the other prescriptive. While both arms seem similarly effective, they appear to address different challenges associated with obesity treatment: MI-via-CALC focusing on the underlying relationship with one's self, and LEARN, the more practical "how to" aspects of weight loss. Consequently, it appears that both

interventions should be made available and even merged on a case-by-case basis for young adults struggling with their weight. Corroborating the results of Article 3, it appears that the personal preferences, needs, and differential learning styles of individuals must be considered.

Conclusions and Future Directions

A number of important conclusions can be drawn upon review of these articles. In accordance with research conducted previously (Newnham-Kanas et al., 2008, 2011; van Zandvoort et al., 2008, 2009), the results of the CHANGE Program highlight the utility of MI-via-CALC as an innovative support and behaviour change technique for individuals with obesity. Based on the present study's findings, MI-via-CALC and the LEARN Program appear similarly effective suggesting that both interventions hold promise and are warranted as SM treatments for attenuating a number of psycho-social and physiological risk factors among young adults with obesity. While the LEARN program provides integral knowledge, strategies, and tips congruent with behavioural and role SM, MI-via-CALC facilitates emotional management through personal reflection and self-exploration. In light of the differential responses observed, future programs should consider the unique contributions of each intervention when working collaboratively with an individual to design a treatment plan congruent with his/her values, aspirations, and goals (Whitworth et al., 2007). The inclusion of participants/clients into the best-fit treatment program may prove to be an essential first step towards instilling the SM tenets of choice and empowerment necessary to incur long-lasting behavioural change in this at-risk population.

To ensure consistency with each condition's delivery format, and using the traditional approach of MI-via-CALC, it was necessary to adapt the LEARN Program for administration over the telephone. Not only is talking on the telephone convenient and accessible, but it allows individuals to remain in the privacy of a location of their choosing when discussing personal issues which may be at the root of their struggles with weight and lifestyle choices. To the best of our knowledge, this is the first study to administer the LEARN Program in this manner. Given the positive results observed across both treatment groups, it is possible that this medium allowed for enhanced programmatic impact. Future research should be conducted to explore the telephone versus in-person delivery format further.

The CHANGE study was not designed to assess the relative contributions of specific programmatic components towards changes in the dependent variables examined (i.e., quality of life, self-esteem, anthropometric and physiological profiles, dietary intake). Given the multi-faceted nature of each treatment, this design aspect of the CHANGE study is an important consideration. Future investigations are warranted to: determine if the effects on these variables can be maintained beyond the six-month time period; uncover how these changes interact to elicit benefits in other health domains; and isolate the specific intervention components that contribute towards these enhancements. In addition, while a large sample size was recruited, the resultant attrition rates were higher than expected; thus, ensuing studies should sample to an even greater extent to account for a loss of participants to follow-up.

This is the largest MI-via-CALC obesity study conducted to date, and the first to use a comparison group to assess its effectiveness as a treatment for obesity in this

population. When administered over the telephone, this program represents an accessible, convenient obesity treatment with the potential to provide substantial reach in a cost-effective manner (i.e., relative to the medical costs that mount over the lifetime of an individual with obesity). Previous studies in other areas of health (e.g., smoking cessation) have examined the impact of telephone hotlines on behaviour change in at-risk populations and found similarly that they are efficient, and able to reach a wide range of individuals (e.g., Tzelepis et al., 2011). In a similar vein, the results of the present study could be used to inform the development of an integrated phone-based treatment (by trained coach volunteers or by subsidization of coaches via government agencies) which would provide callers with a comp1 6816i1 s(lat[(tre)4(ssim3(nt))-4(il)-3(a)4(ti)-3(on ofn, t)] TJETBT1 0

group allocation, participants experienced significant improvements to obesity-related constructs over the course of the 12-week program, changes which were generally maintained up to six months following the intervention. Elements of social support and the experience of participating in the program itself may have contributed toward these enhancements; however, future investigations are warranted to isolate specific contributory factors. In line with the MI-via-CALC model (Whitworth et al., 2007) these findings emphasize the distinctiveness of individuals and their treatment inclinations. The MI-via-CALC and the LEARN Program appear to be equally effective obesity interventions when delivered in this manner indicating that both treatments may be tenable in isolation or in combination with one another. Through focusing on a participant's/client's personal learning styles and needs, MI-via-CALC and LEARN offer a unique framework from which the development of future obesity-based treatments might be designed and implemented.

References

Blaine, B. E., Rodman, J., & Newman, J. M. (2007). Weight loss treatment and psychological well-being: A review and meta-analysis. *Journal of Health Psychology, 12*, 66-82.

Foster, G. D., & Matz, P. E. (2002). Weight loss and changes in body image. In T. F. Cash & T. Pruzinsky (Eds.), *Body image: A handbook of theory, research, and clinical practice* (pp. 405-413). New York: Guilford Press.

Foster, G. D., Wadden, T. A., & Vogt, R. A. (1997). Body image in obese women before, during and after weight loss treatment. *Health Psychology, 16*(3), 226-229.

Martin, K. A., & Lichtenberger, C. M. (2002). Fitness enhancement and body image change. In T. F. Cash & T. Pruzinsky (Eds.), *Body image: A handbook of theory, research, and clinical practice* (pp. 414-421). New York: Guilford Press.

Newnham-Kanas, C. E., Irwin, J. D., & Morrow, D. (2008). Co-Active life coaching as a treatment for people with obesity. *International Journal of Evidence Based Coaching and Mentoring, 6*, 1-12.

Newnham-Kanas, C., Irwin, J. D., Morrow, D., & Battram, D. (2011). The quantitative assessment of Motivational Interviewing using Co-Active life coaching skills as a treatment for adults struggling with obesity. *International Coaching Psychology Review, 6*, 211-225.

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on self-determination theory. *The European Health Psychologist, 10*, 2-5.

Tzelepis, F., Paul, C. L., Walsh, R. A., McElduff, P., & Knight, J. (2011). Proactive telephone counseling for smoking cessation: Meta-analyses by recruitment channel and methodological quality. *Journal of the National Cancer Institute, 103,* 1-20.

van Zandvoort, M., Irwin, J. D., & Morrow, D. (2008). Co-Active coaching as an intervention for obesity among female university students. *International Coaching Psychology Review, 3,* 191-206.

van Zandvoort, M., Irwin, J. D., & Morrow, D. (2009). The Impact of Co-active Life Coaching on Female University Students with Obesity. *International Journal of Evidence Based Coaching and Mentoring, 7*(1), 104-118.

Whitworth, L., Kimsey-House, K., Kimsey-House, H., Sandahl, P. (2007). *Co-Active coaching: New skills for coaching people toward success in work and life* (2nd ed.). California: Davies-Black Publishing.

Appendix A

Copyright Release

Permission Request

Tue, Jul 10, 2012 at 2:01 AM

Dear Erin Pearson,

Thank you for your query.

Inclusion of the paper in a doctoral dissertation is permitted as long as a specific reference is made to Patient Education and Counseling.

Sincerely,

Editor-in-Chief
Patient Education and Counseling

Appendix B

Notice for Recruitment of Certified Professional Co-Active Life Coaches

Researchers Seeking CPCCs
for Coaching & Obesity Study

Dr. Jennifer Irwin and Dr. Don Morrow at the University of Western Ontario (London, Canada) currently are seeking voluntary Certified Professional Co-active Coaches to assist in the delivery of a research study targeting obese university students.

WHAT IS INVOLVED?

- Between January 2011 and June 2011 coaches will be matched with 2-3 clients in the study.
- Each client will receive one 30-45 minute coaching session per week for 12 weeks over the telephone.

Western
Health Sciences

INTERESTED CPCCS PLEASE CONTACT:

ERIN PEARSON
PHD CANDIDATE
PROJECT COORDINATOR
519-661-2111

Appendix C

Notice for Recruitment of Study Participants

Western
Health Sciences

DO YOU STRUGGLE WITH YOUR WEIGHT?

Your participation in this study is welcome if you:

- Are a UWO student between the ages of 18 and 24
- Speak English fluently
- Are overweight and looking to make a change

The C.H.A.N.G.E. Study

Coaching towards Healthy Actions Naturally through Goal-related Empowerment

What is involved?

- If eligible, you will be enrolled in a 12-week health behaviour program
- You will receive a weekly life coaching or lifestyle treatment program
- Questionnaires will be distributed to assess self-efficacy and health status
- Physical changes will be monitored (e.g., waist circumference, bloodwork)

For more information or to sign up, please contact:
Erin Pearson, PhD candidate

Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111 | Erin Pearson 519-661-2111

Appendix D

Participant Eligibility Questionnaire

The CHANGE Study
"Coaching towards Healthy Actions Naturally through Goal-Related Empowerment"

Participant Eligibility Questionnaire – Side A

Date: _____

Age: _____ Gender: _____

Method of Contact: □ E-mail □ Telephone □ In person

Do you speak and write English proficiently? □ Yes □ No

Education: □ Undergraduate student
□ Graduate student

Would you consider yourself healthy overall? □ Yes □ No

Are you currently pregnant or is there any possibility that you could be pregnant?
□ Yes □ No

How tall are you? _____ feet _____ inches OR _____ m/cm
Date of measurement: _____

How much do you weigh? _____ lbs OR _____ kg
Date of measurement: _____

Has your weight fluctuated by more than 5 pounds over the past 6 months?
□ Yes □ No

In the past 6 months to the present day, how many times per week (on average) would you say you have participated in organized sports/exercise activities? _____

Have you been diagnosed with a condition or disease (such as an endocrine disease) that has weight gain as a side effect? □ Yes □ No

Have you experienced any medical condition or episode that my impact your ability to perform physical activity? □ Yes □ No
If yes, document details:
_____
_____

Do you have Type I diabetes? _____Yes _____ No

Participant Eligibility Questionnaire – Side B

Are you on any medication? _____ Yes _____ No
If yes, which medication(s)
_____
_____
_____

Are you currently on any type of diet? □ Yes □ No

Description: _____
_____

If you are eligible to participate in the study, would you be willing to pay 10.00 per session (x 12 sessions) for the treatment you will be receiving? □ Yes □ No

If not, how much could you afford to pay? _____

Comments: _____
_____
_____

For researcher use only:

BMI: _____ kg/m^2

Eligible to participate in the study: □ Yes □ No

Date for Initial Assessment: _____ Time: _____

Appendix E

Western University Research Ethics Approval Notice

Western

Office of Research Ethics

The University of Western Ontario
Room 4180 Support Services Building, London, ON, Canada N6A 5C1
Telephone: (519) 661-3036 Fax: (519) 850-2466 Email: ethics@uwo.ca
Website: www.uwo.ca/research/ethics

Use of Human Subjects - Ethics Approval Notice

Principal Investigator: Dr. J. Irwin
Review Number: **16665E** **Review Level:** Expedited
Review Date: November 25, 2009 **Approved Local # of Participants:** 80
Protocol Title: Assessing the impact of co-active life coaching and goal setting as treatments for obesity: a 12-week intervention
Department and Institution: Faculty of Health Sciences, University of Western Ontario
Sponsor: SOCIAL SCIENCES AND HUMANITIES RESEARCH
Ethics Approval Date: December 15, 2009 **Expiry Date:** August 31, 2012
Documents Reviewed and Approved: UWO Protocol, Letter of Information and Consent (Dec 2, 2009), Recruitment Letter for Coaches, Poster, Newspaper Ad, Phone Script x 3.

Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced study on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the HSREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the HSREB:

a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) all adverse and unexpected experiences or events that are both serious and unexpected;
c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

Chair of HSREB: Dr. Joseph Gilbert
FDA Ref. #: IRB 00000940

Ethics Officer to Contact for Further Information

This is an official document. Please retain the original in your files.

cc: ORE File
LHRI

Appendix F

Participant Letter of Information and Informed Consent

The CHANGE Study
"Coaching towards Healthy Actions Naturally through Goal-Related Empowerment"

You are invited to participate in a study being conducted by Dr. Jennifer Irwin, Dr. Don Morrow, and Erin Pearson from the Faculty of Health Sciences at The University of Western Ontario (UWO). The primary purpose of this research is to examine how behavioural interventions (i.e., Co-Active Life Coaching or Goal Setting) influence physiological and psychological measures associated with obesity over the course of a 12-week program.

A total of 80 participants will be enrolled in the study. In order to participate in the study you need to be a healthy male or female UWO student between the ages of 18-24 year with a body mass index (BMI) $\geq 30 kg/m^2$. You must not possess any health condition that would be contraindicated for exercise, are not pregnant, and do not have type I diabetes. Additionally, you must be able to speak English fluently.

Procedures - If you agree to participate, you will complete the following:
12 week health behaviour program
You will be randomized to one of two groups where you will receive either: 12 sessions with a Certified Co-Active Life Coach; or 12 lifestyle and goal setting sessions with a trained intervention provider affiliated with the study. To off-set the fee charged by these individuals, you will be asked to pay $10.00 for each weekly session. As a participant in the study, you will be asked to telephone your coach or researcher at a pre-determined time every week for approximately 3 months (or 12 sessions). These calls will last between 30 and 40 minutes each time.

Questionnaires:
You will be asked to complete a 3-day food recall record and a series of questionnaires that ask you about your health, self-esteem, and physical activity and nutrition behaviours. Some of these questionnaires indicate that you should answer all of the questions; however you may refuse to answer any of the questions at any time. Completion of the questionnaires will take place in the Qualitative Research Lab located in Elborn College, room 2534, UWO, and should take approximately 15 minutes. These will be administered prior to starting the program, at the 6-week time point, after the program, and at 3, 6, and 12 months post-intervention.

Physical Assessments and Bloodwork:
Physiological Measures:
The following measurements will take approximately 1-2 hours to complete and will be taken at the beginning (Week 1) and end of the program (Week 12), and at 6, and 12 months post-intervention.

- Body mass index (based on height and weight) and waist circumference (using a measuring tape)

- You will have blood drawn (about 8 teaspoons) to measure different components in your blood and to determine whether you're at risk for developing diabetes. This will take place in the lab test centre located at University Hospital, London Health Sciences Centre. As this procedure requires that you fast (no food or liquids) from midnight
  the night prior, you will be asked to have this done in the morning prior to initiating the intervention and at the timepoints indicated above.
- You will be asked to visit a Shopper's Drug Mart of your choosing where you will have your blood pressure taken in the pharmacy section of the store by a machine. A cuff will be placed around your upper arm and inflated periodically in the same manner as blood pressure measurements taken by a physician. You will be asked to report this value back to the research team.

Feedback from the study
You may request the general findings of this research after the study is complete. If you have any concerns, please feel free to contact the researchers below. This letter is for you to keep.

Potential Risks and Discomforts
Blood Pressure: While it is inflated, the blood pressure cuff used in the study may cause your arm to turn blue slightly or become numb, but this will disappear quickly once the cuff has been turned off.

Speaking about the risks associated with excess body weight may elicit feelings of distress or upset both during and after the intervention. If you feel that you would like to share your feelings with individuals outside of the study environment, there are resources available in London and area.

- The London and District Distress Centre
  24 hours per/day, 7 days/week
- Your family physician
- A walk-in clinic or Emergency Department

Potential Benefits
You may experience some of the benefits associated with lifestyle changes (e.g., increased physical exercise) including increased energy, cardiovascular benefits, increased strength, better circulation, increased flexibility and weight loss. You may also experience increases in psychological well-being (e.g., improved self-esteem and quality of life), enhanced confidence, happiness, and decreased feelings of isolation. Improved physiological outcomes may also occur (e.g., blood profile, decreases in blood pressure and body mass index, etc.) as well as positive dietary outcomes.

Voluntary Participation
Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time.

Compensation
There is a $10 cost per session for participating in this study.

Confidentiality
Your participation in this study is completely confidential. The information from the measures and questionnaires will only be for the use of the researchers listed. The completed questionnaires will be stored in a locked cabinet, inside a locked office. After 3 years, all of the questionnaires will be shredded. By participating in this research, you agree that your results may be used for scientific purposes, including publication in scientific and exercise & health specific journals. A master list will be maintained linking your name as a participant to an identifying number. Upon completion of the study, this list will be destroyed. The results of the study will be reported without identifying you personally thus maintaining your confidentiality.

Rights of Subjects
If you have any questions about the conduct of this study or your rights as a research participant you may contact: The Director - Office of Research Ethics
The University of Western Ontario

Contact Information:
If you have any questions or concerns about the research, please feel free to contact Dr. Jennifer Irwin or Erin Pearson.

INFORMED CONSENT

I, _____ have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Print name: _____ Date: _____

Signature: _____

Name of Researcher: _____ Date: _____

Signature: _____

Appendix G

Participant Demographic Information Form

DEMOGRAPHIC INFORMATION

ID Number: _____

School Year Address:_____

City: _____ Province: _____ Postal Code: _____

Home Address (if different from school) _____

City: _____ Province: _____ Postal Code: _____

Home Phone: _____ Cellular Phone: _____

E-mail: _____

Age: _____ Date of Birth: _____
Day/Month/Year

Weight: (lbs) _____ Height: (in) _____

Ethnicity: _____

Education: □
Undergraduate student Year: _____ Discipline: _____

Degree: _____ (e.g., BA, BA Honors, BHSc, BHSc Honors…)

Graduate student Year: _____ Discipline: _____

Degree: _____ (e.g., M.Sc., M.A., Ph.D….)

Are you under a physician's care for any condition currently? If yes, which condition?:
_____
_____

Occupation: _____

Do you smoke? □ Yes □ No

To be completed by researcher:

Weight: _____ lb _____kg

Height: _____in _____cm

BMI: _____ kg/m^2 Waist Circumference: _____

Appendix H

Physical Activity Readiness Questionnaire

Physical Activity Readiness Questionnaire
PAR-Q

For most people physical activity should not pose any problems or hazards. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

Please read each question carefully and check yes or no opposite the question if it applies to you. Completing this quiz will give you an idea if you should consult your doctor before starting an exercise program. Your doctor can advise you and the researcher as to which exercise and intensity is best for you.

	Yes	**No**	
1.	____	____	Has your doctor ever said you have heart trouble?
2.	____	____	Do you frequently have pains in your heart and chest?
3.	____	____	Do you often feel faint or have spells of severe dizziness?
4.	____	____	Has a doctor ever said your blood pressure was too high?
5.	____	____	Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise?
6.	____	____	Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?
7.	____	____	Are you over age 65 and not accustomed to vigorous exercise?

If you answered YES to one or more questions….
If you have not recently done so, consult with your personal physician by telephone or in person before increasing your physical activity and/or taking a fitness test.

If you answered NO to all questions…. If you answered PAR-Q accurately, you have reasonable assurance of your present suitability for an exercise test and may begin an exercise program with your personal health coach.

Appendix I

The Short Form 36-Item Functional Health Status Scale

The CHANGE Study
"Coaching towards Healthy Actions Naturally through
Goal-Related Empowerment"

ID #: _____ Date: _____

SF-36 Functional Health Status Scale

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. Please answer these questions by "check-marking" your choice. Please select only one choice for each item.

1. In general, would you say your health is:
□ 1. Excellent □ 2. Very good □ 3. Good □ 4. Fair □ 5. Poor

2. Compared to ONE YEAR AGO, how would you rate your health in general NOW?

□ 1. MUCH BETTER than one year ago.
□ 2. Somewhat BETTER now than one year ago.
□ 3. About the SAME as one year ago.
□ 4. Somewhat WORSE now than one year ago.
□ 5. MUCH WORSE now than one year ago.

3. The following items are about activities you might do during a typical day. **Does your health now limit you** in these activities? If so, how much?

Activities	**1. Yes, Limited A Lot**	**2. Yes, Limited A Little**	**3. No, Not Limited At All**
a) **Vigorous activities,** such as running, lifting heavy objects, participating in strenuous sports?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
b) **Moderate activities,** such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
c) Lifting or carrying groceries?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
d) Climbing **several flights** of stairs?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
e) Climbing **one** flight of stairs?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
f) Bending, kneeing or stooping?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
g) Walking **more than a mile**?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
h) Walking **several** blocks?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all

i) Walking **one** block?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all
j) Bathing or dressing yourself?	□ 1. Yes, limited a lot	□ 2. Yes, limited a little	□ 3. No, not limited at all

4. During the **past 4 weeks**, have you had any of the following problems with your work or other regular activities *as a result of your physical health*?

	Yes	No
a) Cut down on the **amount of time** you spent on work or other activities?	□ 1. yes	□ 2. No
b) **Accomplished less** than you would like?	□ 1. yes	□ 2. No
c) Were limited in the **kind** of work or other activities?	□ 1. yes	□ 2. No
d) Had **difficulty** performing the work or other activities (for example it took extra effort)?	□ 1. yes	□ 2. No

5. During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

	Yes	No
a) Cut down on the **amount of time** you spent on work or other activities?	□ 1. yes	□ 2. No
b) **Accomplished less** than you would like?	□ 1. yes	□ 2. No
c) Didn't do work or other activities as **carefully** as usual?	□ 1. yes	□ 2. No

6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?
□ 1. Not at all □ 2. Slightly □ 3. Moderately □ 4. Quite a bit □ 5. Extremely

7. How much **bodily pain** have you had during the **past 4 weeks**?
□ 1. None □ 2. Very mild □ 3. Mild □ 4. Moderate □ 5. Severe □ 6. Very severe

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?
□ 1. Not at all □ 2. A little bit □ 3. Moderately □ 4. Quite a bit □ 5. Extremely

9. These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question , please give the one answer that comes closest to the way you have been feeling. How much of the time during the **past 4 weeks** …

	1. All of the time	2. Most of the time	3. A good bit of the time	4. Some of the time	5. A little of the time	6. None of the time
a) Did you feel full of pep?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
b) Have you been a very nervous person?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
c) Have you felt so down in the dumps that nothing could cheer you up?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
d) Have you felt calm and peaceful?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
e) Did you have a lot of energy?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
f) Have you felt downhearted and blue?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
g) Do you feel worn out?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
h) Have you been a happy person?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time
i) Did you feel tired?	□ 1. All of the time	□ 2. Most of the time	□ 3. A good bit of the time	□ 4. Some of the time	□ 5. A little of the time	□ 6. None of the time

10. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

□ 1. All of the time
□ 2. Most of the time
□ 3. Some of the time
□ 4. A little of the time
□ 5. None of the time.

11. How TRUE or FALSE is **each** of the following statements for you?

	1. Definitely true	2. Mostly true	3. Don't know	4. Mostly false	5. Definitely false
a) I seem to get sick a little easier than other people?	□ 1. Definitely true	□ 2. Mostly true	□ 3. Don't know	□ 4. Mostly false	□ 5. Definitely false
b) I am as healthy as anybody I know?	□ 1. Definitely true	□ 2. Mostly true	□ 3. Don't know	□ 4. Mostly false	□ 5. Definitely false
c) I expect my health to get worse?	□ 1. Definitely true	□ 2. Mostly true	□ 3. Don't know	□ 4. Mostly false	□ 5. Definitely false
d) My health is excellent?	□ 1. Definitely true	□ 2. Mostly true	□ 3. Don't know	□ 4. Mostly false	□ 5. Definitely false

Appendix J

The International Physical Activity Questionnaire

ID: _____ Date: _____

Short Form International Physical Activity Questionnaire (IPAQ)

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**
   _____ **minutes per day**
   _____ **Don't know/Not sure**

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____ **days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

   _____ **hours per day**
   _____ **minutes per day**
   _____ **Don't know/Not sure**

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**
_____ **minutes per day**
_____ **Don't know/Not sure**

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**
_____ **minutes per day**
_____ **Don't know/Not sure**

This is the end of the questionnaire, thank you for participating.

Appendix K

The Rosenberg Self-Esteem Scale

ID: _____ Date: _____

The Rosenberg Self-Esteem Scale

BELOW IS A LIST OF STATEMENTS DEALING WITH YOUR GENERAL FEELINGS ABOUT YOURSELF. IF YOU **STRONGLY AGREE**, CIRCLE **SA**. IF YOU **AGREE** WITH THE STATEMENT, CIRCLE **A**. IF YOU **DISAGREE**, CIRCLE **D**. IF YOU **STRONGLY DISAGREE**, CIRCLE **SD**.

		1. STRONGLY AGREE	2 AGREE	3. DISAGREE	4. STRONGLY DISAGREE
1.	I feel that I'm a person of worth, at least on an equal plane with others.	SA	A	D	SD
2.	I feel that I have a number of good qualities.	SA	A	D	SD
3.	All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
4.	I am able to do things as well as most other people.	SA	A	D	SD
5.	I feel I do not have much to be proud of.	SA	A	D	SD
6.	I take a positive attitude toward myself.	SA	A	D	SD
7.	On the whole, I am satisfied with myself.	SA	A	D	SD
8.	I wish I could have more respect for myself.	SA	A	D	SD
9.	I certainly feel useless at times.	SA	A	D	SD
10.	At times I think I am no good at all.	SA	A	D	SD

Appendix L

Self-Efficacy Scales for Physical Activity and Nutrition

ID: _____ Date: _____

Overcoming Barriers to Nutrition

Please indicate below how confident you are that you can successfully carry out each of the activities listed below using the following scale.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
No Confidence at All Somewhat Confident Completely Confident

How certain are you that you could overcome the following barriers?

I can manage to stick to eating a well-balanced diet with predominately healthful foods, and reduced junk food…

1. …even if I need a long time to develop the necessary routines _____%
2. …even if I have to try several times until it works _____%
3. …even if I have to rethink my entire way of nutrition _____%
4. …even if I do not receive a great deal of support from others when making my first attempts _____%
5. …even if I have to make a detailed plan _____%
6. …even if I am traveling _____%
7. …even if it means bringing my meal to work _____%
8. …even if I am eating at a restaurant _____%
9. …even if I am going to a friends house for a meal _____%
10. …even if the healthful meal is more expensive _____%
11. …even if junk food is more available than healthful food _____%

ID: _____ Date: _____

Overcoming Barriers to Physical Activity

The items below reflect common reasons preventing people from participating in physical activity programs or, in some cases, dropping out or quitting the program altogether. Using the scale below, please indicate how confident you are that you could be physically active in the event that any of the following circumstances were to occur.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
No Confidence at All Somewhat Confident Completely Confident

For example, if you have *complete confidence* that you can continue to be physically active, even if you are bored by the activity, you would record 100% in the space provided. However, if you are absolutely sure that you *could not* be physically active if you failed to make or continue make progress you would record 0% in the space provided.

I believe that I can be moderately physically active 5 times per week if:

1. The weather is very bad (hot, humid, rainy, snow, cold) _____%
2. I was bored by the program or activity _____%
3. I was on vacation _____%
4. I felt pain or discomfort when being active _____%
5. I had to be active alone _____%
6. Physical activity was not enjoyable or fun _____%
7. It became difficult to get to the activity location _____%
8. I didn't like the particular activity program I was doing _____%
9. My work schedule conflicted with my activity program _____%
10. I felt self-conscious about my appearance when active _____%
11. The class instructor did not offer me any encouragement _____%
12. I was under personal stress of some kind _____%

ID: _____ **Date:** _____

Achieving Tasks in Physical Activity

Please indicate below how confident you are that you can successfully carry out each of the activities listed below using the following scale.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
No Confidence at All Somewhat Confident Completely Confident

For example, if you have *complete confidence* that you can complete 15-minutes of continuous moderate intensity activity each day, you would record 100% in the space provided. However, if you are *not very confident* that you could complete 30-minutres of continuous moderate intensity activity each day, you would record a number closer to 0% in the space provided.

I believe that I can be moderately physically active 5 times per week…

1. For 3 bouts of activity, each lasting 10 consecutive minutes _____
2. For 2 bouts of activity, each lasting 15 consecutive minutes _____
3. For 1 bout of activity, lasting 30 consecutive minutes _____
4. For 1 bout of activity, lasting more than 30 consecutive minutes _____

Appendix M

Treatment Self-Regulation Questionnaires

ID # _____ **Date:** _____

Treatment Self-Regulation Questionnaire (TSRQ)

Treatment Questionnaire Concerning Entering the CHANGE Program

There are a variety of reasons why patients decide to enter a weight-loss program such as this and follow its procedures. The items on this questionnaire are broken into four groups. Please read the statement at the beginning of each group and then consider the reasons that follow it in terms of how true that reason is for you. The scale is:

1	2	3	4	5	6	7
not at all true			somewhat true			very true

A. **I decided to enter this weight-loss program because:**

1. I won't like myself very much until I lose weight. _____
2. People will like me better when I'm thin. _____
3. It feels important to me personally to be thinner. _____
4. I really want to make some changes in my life. _____

B. **If I remain in treatment it will probably be because:**

5. I'll feel like a failure if I don't. _____
6. People will think I'm a weak person if I don't. _____
7. I'll feel very bad about myself if I don't. _____
8. Others will be angry at me if I don't. _____
9. I feel like it's the best way to help myself. _____

C. **I plan to lose weight because:**

10. I'll be ashamed of myself if I don't. _____
11. I'll hate myself if I can't get my weight under control. _____
12. My friends/family don't like the way I look. _____
13. Being overweight makes it hard to do many things. _____

D. **I have agreed to follow the procedures/suggestions of the program because:**

14. I am worried that I will get in trouble with the study staff if I don't follow all the guidelines. _____
15. I'll feel guilty if I don't comply with all the procedures/suggestions. _____
16. I want others to see that I am really trying to lose weight. _____
17. I believe they will help me solve my problem. _____
18. It's important to me that my efforts succeed. _____

ID # _____ **Date: _____**

Treatment Questionnaire Concerning Continued Participation in the CHANGE Program (TSRQ-C)

The following questions relate to your reasons for continuing to participate in the weight-loss program. Different people have different reasons for continuing in such a program, and we want to know how true each of these reasons is for you. There are two groups of questions. The questions in each group pertain to the sentence that begins that group. Please indicate how true each reason is for you, using the following scale:

1	2	3	4	5	6	7
not at all true			somewhat true			very true

A. I have remained in the program because:

1. I would have felt bad about myself if I didn't. _____
2. Others would have been angry at me if I didn't. _____
3. I would have felt like a failure if I didn't. _____
4. I feel like it's the best way to help myself. _____
5. People would think I'm a weak person if I didn't. _____
6. I have chosen not to leave the program. _____
7. It is a challenge to accomplish my goal. _____
8. I have invested so much money in this program. _____

B. I have been following the procedures/suggestions of the program because:

9. I believe they help me solve my problem. _____
10. I have been worried that I would get in trouble with the study staff if I didn't follow all the guidelines. _____
11. I want others to see that I am really trying to lose weight. _____
12. It is important to me that my efforts succeed. _____
13. I feel guilty if I don't comply with all the procedures. _____

Appendix N

Perceived Competence Scale

ID: _____ Date: _____

Perceived Competence for Healthy Body Weight

Please respond to each of the following items in terms of how true it is for you with respect to dealing with your body weight. Use the scale:

1	2	3	4	5	6	7
not at all true			somewhat true			very true

1. I feel confident in my ability to manage my body weight
2. I am capable of handling my body weight now.
3. I am able to engage in behaviours that promote a healthy body weight now.
4. I feel able to meet the challenge of controlling my body weight.

* * * * * * * * * * * * * *

Perceived Competence for the CHANGE Program

Please respond to each of the following items in terms of how true it is for you with respect to your this program. Use the scale:

1	2	3	4	5	6	7
not at all true			somewhat true			very true

1. I feel confident in my ability to incorporate study-related learnings into my life.
2. I am capable of learning the new concepts from this study.
3. I am able to achieve my goals in this study.
4. I feel able to meet the challenge of following through on the learnings from this study.

* * * * * * * * * * * *

Appendix O

24-Hour Dietary Recall

One Day Food Recall

Date:

Name: **ID:**

Age: **Sex:**

List everything you ate and drank yesterday. Include ALL *meals*, *beverages (including alcohol), and snacks*. If possible, indicate how the food was prepared (e.g., fried, baked, grilled, etc.),whether it was fresh, frozen, or canned, and the brand name. *Be specific regarding portions and sizes.*

Example: Breakfast	1 cup bran cereal, 1/2 cup 1% milk 1 slice whole wheat toast with butter (1 tsp.) 1 cup coffee (1 tbsp. 1% milk and 1 tsp. sugar)

Breakfast Time Location	
Morning Snack Time Location	
Lunch Time	

Location	
Afternoon Snack Time Location	
Dinner Time Location	
Evening Snack Time Location	

Notes:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Appendix P

Protocol for Bloodwork and Blood Pressure Measurements

Blood-draw Instructions for the CHANGE Study

- Blood draws for the CHANGE study will take place at London Health Sciences Center.
- You may go to either University or Victoria Hospital depending on what is most accessible for you.
- Two pieces of identification are required for your first visit. These should include your health card and another valid piece of identification.
- Upon arriving for your first visit, please proceed to "Patient Registration" to be registered. This is located on level one to the right of the main doors at University Hospital, and at the end of the walkway on level three at Victoria Hospital.
- You will receive a blue hospital card from Patient Registration. Please bring this with you to subsequent visits in addition to your health card and a research requisition.
- For all remaining visits, you may bypass Patient Registration and proceed directly to the Lab Test Centre location.
- If you are feeling ill, please do not go to the hospital; make plans to attend when you are in good health.

Location	**Hours**	**Room #**	**Directions**
University Hospital	Monday to Friday: 8am-430pm	BLL-203	• Enter the hospital at the main entrance off Perth Drive • Walk to the Outpatient Elevators (#9 and #10) located behind Tim Hortons • Take the elevator down to the Basement (press "B") • The elevator doors will open up into the "Blood Taking" waiting room • Present your requisition/papers to the volunteer on duty or take a number
Victoria Hospital	Monday to Friday 830am-430pm	A2-600	• Enter the hospital at Entrance "C" off Commissioners Rd (at Wellington); street level • Once inside the doorway turn left. Walk straight ahead for a short distance and take the hallway on your right • Walk down this hallway to the main intersection. Enter the large (urology) waiting room on your left. Present your requisition/papers to the clerk at the registration desk • Take a seat in the waiting area

NOTE:

- Please do not eat or drink *ANYTHING* for 12 hours before your blood draw.
- You can have plain water until your appointment time.
- You may want to bring a snack with you for afterwards.

Blood Pressure Machine
Shoppers Drug Mart Locations

You will be asked to have your blood pressure taken prior to beginning the study, half way through the study, immediately following the study, and at the 3 and 6 month follow-up time points. The Blood Pressure Machines are located by the pharmacy section within each store. To use, place your arm into the cuff and press the "start" button. The cuff will inflate, and then slowly deflate. Your blood pressure will appear digitally on the machine. Record both the top and the bottom number on the sheet provided (e.g., 130/86).
Each time, please try to have your blood pressure taken under the same circumstances, around the same time of day, and by the same blood pressure machine (if at all possible).

141 Dundas St
London ON N6A 1G3
Mon. to Thurs. 8:00am-6:00pm
Fri. 8:00am-7:00pm
Sat. 9:00am-5:30pm

140 Oxford Street East
London ON N6A 1T3
Mon. to Fri. 9:00am-7:00pm
Sat. 10:00am-4:00pm
Sun. 10:00am-3:00pm

759 Adelaide St.N.
London ON N5Y 2L7
Mon. to Sun. 8:00am-10:00pm

510 Hamilton Rd
London ON N5Z 1S4
Mon. to Fri. 9:00am-6:00pm
Sat. 9:00am-5:00pm

467 Wharncliffe Rd S.
London ON N6J 2M8
Mon. to Sun. 8:00am-10:00pm

645 Commissioners Rd
London ON N6C 2T9
Open 24 hours

301 Oxford Street W
London ON N6H 1S6
Mon. to Fri. 9:00am-8:00pm
Sat. 9:00am-7:00pm
Sun. 11:00am-5:00pm

921 Leathorne Street
London ON N5Z 3M7
Mon. to Fri. 8:30am-5:00pm

641 Commissioners Road E
London ON N6C 2T9
Mon. to Fri. 9:00am-6:00pm
Sat. 9:00am-5:00pm
Sun. 12:00am-5:00pm

1118 Adelaide St N
London ON N5Y 2N5
Mon. to Sun. 8:00am-Midnight

The CHANGE Study
Blood Pressure Monitoring Sheet

ID #_____

Name: _____

Blood Pressure Reading #1: _____/_____ Date: _____
(Baseline)
RHR: _____

Blood Pressure Reading #2: _____/_____ Date: _____
(6-weeks)
RHR: _____

Blood Pressure Reading #3: _____/_____ Date: _____
(12-weeks)
RHR: _____

Blood Pressure Reading #4: _____/_____ Date: _____
(3-month follow-up)
RHR: _____

Blood Pressure Reading #5: _____/_____ Date: _____
(6-month follow-up)
RHR: _____

Appendix Q

Coach/Specialist Assignment Form

The CHANGE Study

Welcome to the CHANGE study! Now that you have completed your baseline assessment (i.e., questionnaires, bloodwork, and blood pressure), you are ready to begin your lifestyle program).

You have been assigned to work with _____. Please call or e-mail this individual before _____ to arrange your first session. Once you have arranged this appointment, please notify Erin with the date via e-mail or telephone.

Name: _____
E-mail: _____
Telephone: _____

Appendix R

Completion and Follow-up Assessment Questionnaires

The CHANGE Study
COMPLETION QUESTIONNAIRE

ID Number: _____ **Name: _____**

Based on your experience in the study, please answer the following questions. Choose the option that **best** reflects your feelings.

1. **I completed _____ sessions with my intervention specialist.**

2. **Of these ____ sessions, I had to reschedule _____ of them with my intervention specialist due to**
   _____.

3. **I completed the study because:**
a) I made the commitment to do so
b) I found that my treatment was useful for me
c) I was motivated to make healthy changes for myself
d) I enjoyed working with my treatment specialist
e) Other (please describe below):

_____

4. **Upon joining the study, my primary goal was to:**
a) lose weight
b) feel better about myself
c) become more active
d) eat healthier
e) become healthier in general
f) Other (please describe below):

_____

5. **Now, having completed the study, my primary goal is to:**

_____

6. **At present, what (if any) would you say is the greatest challenge you are facing with respect to making lifestyle changes (e.g., exercising more, making healthy food choices)?**
a) Making time in my schedule
b) Feeling motivated to make changes
c) Lack of social support (e.g., friends, family)
d) I don't believe that I am capable of making changes
e) I do not have any overwhelming challenges at present
f) Other (please describe below)

_____

7. At present, what (if any) would you say is your greatest <u>motivator</u> with respect to making healthy changes for yourself?

a) Observing physical changes in myself such as weight loss and my clothes fitting differently
b) Feeling better about myself
c) Having more energy
d) Feeling like I have more control over my decisions
e) Other (please describe below)

_____

8. What types of lifestyle changes did you make as a result of your involvement in the study (if any)? For example, dietary changes, taking up a new physical activity program, joining a gym, stopping a medication…

_____
_____
_____
_____

9. What did you find <u>most</u> helpful about the study and why?

_____
_____
_____
_____

10. What did you find <u>least</u> helpful about the study and why?

_____
_____
_____
_____

Please complete the following sentence:
11. The number one thing that I got out of this study was …

_____
_____

Additional Comments:

_____
_____
_____
_____

Thank you for taking the time to complete this questionnaire.

The CHANGE Study
3 and 6 MONTH FOLLOW-UP QUESTIONNAIRE

ID Number: _____ Name: _____ F-up: _____

Based on your experience since the study ended, please answer the following questions. Choose the option that **best** reflects your feelings.

1. Upon joining the study, your primary goal was to:

g) lose weight
h) feel better about myself
i) become more active
j) eat healthier
k) become healthier in general
l) Other (please describe below):

_____

2. Since completing the study, your primary goal now is to:

_____
_____

3. At present, what (if any) would you say is the greatest challenge you are facing with respect to making lifestyle changes and/or reaching your goals (e.g., exercising more, making healthy food choices)?

a) Making time in my schedule
b) Feeling motivated to make changes
c) Lack of social support (e.g., friends, family)
d) I don't believe that I am capable of making changes
e) I do not have any overwhelming challenges at present
f) Other (please describe below)

_____
_____

4. At present, what (if any) would you say is your greatest motivator with respect to making healthy changes for yourself?

a) Observing physical changes in myself such as weight loss and my clothes fitting differently
b) Feeling better about myself
c) Having more energy
d) Feeling like I have more control over my decisions
e) Other (please describe below)

_____
_____

5. **What types of actions have you taken in the past three months that you attribute to your specific treatment and involvement in the study (if any)?**

_____
_____
_____
_____
_____

6. **What (if anything) is different about how you feel about yourself now since the study ended (i.e. how has your life changed)?**

_____
_____
_____
_____
_____

7. **Is there anything else you would like us to know that we have not asked about already?**

_____
_____
_____
_____
_____
_____

Thank you for taking the time to complete this questionnaire.

CURRICULUM VITAE
Erin S. Pearson

EDUCATION AND ACADEMIC DEGREES

Western University (formerly the University of Western Ontario)

Degree	Department	Year
Ph.D. (ABD)	Faculty of Health Sciences: Health and Rehabilitation Sciences Program - Specialization in Health Promotion *Co-Supervisors: Dr. Jennifer Irwin and Dr. Don Morrow* Ph.D. Title: The CHANGE Program: Comparing and Interactive versus Prescriptive Telephone-Based Behavioural Intervention on the Psychological and Physiological Profiles of University Students with Obesity	2012
M.Sc.	Faculty of Health Sciences: Health and Rehabilitation Sciences Program - Specialization in Health Promotion *Supervisor: Dr. Craig Hall* M.Sc. Title: The Impact of Body Composition Feedback on Body Image, Motivation, and Adherence in an Exercise Program for Women	2008
BHSc. Hons.	Faculty of Health Sciences – Honours Specialization	2006

ACADEMIC AWARDS AND HONORS

Year	Scholarships
2009	Social Sciences and Humanities Research Council of Canada - Joseph Bombardier Canadian Graduate Scholarship
2009	The Coaches Training Institute – Program Scholarship
2008	Dean's Doctoral Studies Entrance Scholarship
2008	The Coaches Training Institute – Program Scholarship
	Achievements and Awards
2012	Faculty of Health Sciences Travel Award
	Western Graduate Thesis Award
	Health & Rehabilitation Sciences Travel Award

2011	Health & Rehabilitation Sciences Travel Award
2010	Faculty of Health Sciences Travel Award
2009	Health & Rehabilitation Sciences Travel Award
2009	Health Over the Life Course National Confer Student poster competition – 1st runner-up
2009	Canadian Institutes of Health Research – Institute of Human Development and Child and Youth Health Travel Award
2009	Western Graduate Thesis Award
2008	Canadian Obesity Network 3rd Annual Obesity Boot Camp

ACADEMIC EMPLOYMENT HISTORY

Course Instruction (Western)

Lecturer: Faculty of Health Sciences – School of Health Studies 2012
Health Sciences 3290b: Special Topics in Health Promotion
Class size: 58 students

Lecturer: Faculty of Health Sciences – School of Health Studies 2011
Health Sciences 4800g: Methods in Evidence-Based Practice
Class size: 10 students

Lecturer: Faculty of Health Sciences – School of Health Studies 2010
Health Sciences 1001a/1002b: Personal and Social Determinants of Health
Six Nations Polytechnic Institute, Brantford, Ontario (school affiliated with Western). Courses cancelled in September 2010 due to low enrollment

Research Assistantships (Western)

Project Coordinator Apr 2008 –Aug 2010
The Children's Health & Activity Modification Program (C.H.A.M.P.): A community-based lifestyle intervention for obese children at risk for type II diabetes and their families
Principal Investigator: Dr. Shauna Burke

Research Assistant Jan 2008 – June 2008
Using imagery interventions to increase exercise participation
Principal Investigator: Dr. Craig Hall

Research Assistant Sept 2006 - Dec 2007
Examining self-determined motives, needs satisfaction, and self-regulation in "action" stage exercisers
Principal Investigator: Dr. Craig Hall

Graduate Teaching Assistantships (Western)

Health Sciences 1001 Sept – Dec 2008; Jan – Apr 2008
Introduction to Health and Wellness – The Social Determinants of Health
Professor: Dr. Jessica Polzer
Class size: approximately 500 students

Health Sciences 1001 Jan – Apr 2007
Introduction to Health and Wellness – The Social Determinants of Health
Instructor: Steve Trujillo
Class size: approximately 500 students

PUBLICATIONS

Articles in Peer-Reviewed Journals

1. **Pearson, E.**, Irwin, J., & Burke, S. (in press). The Children's Health and Activity Modification Program (C.H.A.M.P.): Participant perspectives of a 4-week lifestyle intervention for children with obesity. *Journal of Child Health Care.*

2. **Pearson, E. S.** (2012). Goal setting as a health behaviour change strategy in overweight and obese adults: A systematic literature review examining intervention components. *Patient Education and Counseling, 87*, 32-42.

3. **Pearson, E. S.** (2011). The "how-to" of health behaviour change brought to life: A theoretical analysis of the Co-Active coaching model and its underpinnings in self-determination theory. *Coaching: An International Journal of Theory, Research, and Practice, 4*(2), 89-103.

4. **Pearson, E.,** Hall, C. & Gammage, K. (2011). Self-presentation in exercise: Changes over a 12-week cardiovascular program for sedentary females with overweight and obesity. *European Journal of Sport Science.* doi:10.1080/17461391.2012.660504

5. Rodgers, W., Hall, C., Duncan, L**., Pearson, E.,** & Milne, M. (2010). Becoming a regular exerciser: Examining change in behavioural regulations among exercise initiates. *Psychology of Sport and Exercise, 11,* 378-386.

Articles in Peer-Reviewed Journals – Under Review

6. **Pearson, E. S.**, Irwin, J. D., & Burke, S. M., & Shapiro, S. (under review). Parental perspectives of a lifestyle camp for children with obesity.

7. **Pearson, E**., Hall, C., Rodgers, W., Wilson, P., & Markland, D. (under review). The influence of providing personalized body weight and body composition information on exercise motivation among overweight, sedentary women initiating an exercise program.

8. **Pearson, E.**, Irwin, J. D., & Morrow, D. (under review). The CHANGE Program: Comparing an interactive versus prescriptive obesity intervention on university students' self-esteem and functional health status.

9. **Pearson, E. S.**, Irwin, J. D., & Morrow, D. (under review). The CHANGE Program: A methodological account of a goal-based study for university students comparing an interactive versus standardized 12-week treatment for obesity.

Published Abstracts (for refereed conference presentations)

1. Burke, S. M., & **Pearson, E. S.** (2012). The Impact of a Group-Based Lifestyle Intervention on Obese Children's Self-Efficacy for Physical Activity. *Journal of Sport and Exercise Psychology, 34*(Suppl.).

2. **Pearson, E.,** Burke, S., Irwin, J, & Shapiro, S. (2011). Parents' perspectives of the Children's Health and Activity Modification Program (C.H.A.M.P.): A family-based lifestyle intervention for obese children. *Journal of Sport and Exercise Psychology, 33*(Suppl.).

3. **Pearson, E. S.**, Irwin, J. D., & Morrow, D. (May, 2011). CHANGE-ing obesity: A methodological account of a comprehensive study for university students with obesity. *Canadian Journal of Diabetes,* 182-183.

4. **Pearson, E.,** & Hall, C. (2010). Examining the effects of an 18-week cardiovascular exercise program on body image in overweight and obese women. *Journal of Sport and Exercise Psychology, 32*(Suppl.).

5. **Pearson, E.,** Hall, C., & Gammage, K. (2009). Self-presentation in exercise: A 12-week cardiovascular program for overweight female initiates. *Journal of Sport and Exercise Psychology, 31*(Suppl.).

6. Gray, C., McGowan, E., **Pearson, E**., Hall, C., Prapavessis, H., Shapcott, K. et al. (2009). Do behavioural regulations drive physical activity behaviour in "action" stage exercisers? *Journal of Sport and Exercise Psychology, 31*(Suppl.).

7. McGowan, E., **Pearson, E**., Hall, C., Prapavessis, H., Shapcott, K., Newnham-Kanas, C. et al. (2008). Examining needs satisfaction in "action" stage exercisers. *Journal of Sport and Exercise Psychology, 30*(Suppl.).

Refereed Presentations to Scholarly and Professional Groups (unpublished abstracts)

1. **Pearson, E. S.**, Irwin, J. D., & Morrow, D. (2012, May). *The CHANGE Program: Comparing an interactive versus standardized obesity intervention on students' self-esteem, functional health status, and self-efficacy for performing physical activity and nutrition behaviours.* Poster presented at the International Society for Behavioural Nutrition and Physical Activity Annual Meeting, Austin, Texas.

2. **Pearson, E. S.**, Burke, S., Irwin, J., & Shapiro, S. (2011, October). *The C.H.A.M.P. Program: Annual update and qualitative findings*. Lecture presented at the 8th Lawson Foundation Diabetes Workshop, Toronto, Ontario.

3. **Pearson, E. S.**, Irwin, J. D., & Burke, S. M. (2011, June). *The Children's Health and Activity Modification Program (C.H.A.M.P.): Parent perspectives of a family-based lifestyle intervention for obese children*. Lecture presented at the North American Society for the Psychology of Sport and Physical Activity Conference, Burlington, Vermont.

4. **Pearson, E. S.**, Irwin, J. D., & Morrow, D. (2011, April). *CHANGE-ing obesity: A methodological account of a comprehensive study for university students with obesity.* Poster presentation at the Canadian National Obesity Summit, Montreal, Quebec.

5. Burke, S., **Pearson, E.**, & Shapiro, S. (2010, October). *The C.H.A.M.P. Program: Annual update and next steps*. Lecture presented at the 7th Lawson Foundation Diabetes Workshop, Edmonton, Alberta.

6. **Pearson, E. S.**, & Hall, C. (2010, June). *Examining the effects of an 18-week cardiovascular exercise program on body image in overweight and obese women*. Lecture presented at the North American Society for the Psychology of Sport and Physical Activity Conference, Tucson, Arizona.

7. **Pearson, E. S.,** Irwin, J., & Burke, S. M. (2010, March). *The Children's Health and Activity Modification Program (C.H.A.M.P.): Exploring the impact of a 4-week lifestyle intervention on obese children and their families*. Poster presented at the Faculty of Health Sciences Research Day, The University of Western Ontario, London, Ontario.

8. **Pearson, E**., Irwin, J., & Burke, S. (2009, October). *The Children's Health and Activity Modification Program (C.H.A.M.P.): Exploring the impact of a 4-week lifestyle intervention on obese children and their families*. Poster presented at the Health over the Life Course Conference, London, Ontario.

9. **Pearson, E.,** Hall, C., & Rodgers, W. (2009, October). *From initiate to regular exerciser? Examining exercise motivation in an 18-week cardiovascular program for non-exercising, overweight women.* Poster presented at the Canadian Society for Psychomotor Learning and Sport Psychology Conference, Toronto, Ontario.

10. Burke, S. M., **Pearson, E. S.,** & Prapavessis, H. (2009, June). *The effectiveness of a group-based lifestyle program on body composition in obese children: A pilot project*. Symposium presented on behalf of the first author at the International Society for Behavioural Nutrition and Physical Activity Annual Meeting, Lisbon, Portugal.

11. **Pearson, E.**, Irwin, J., & Burke, S. (2009, June). *C.H.A.M.P.: Exploring the impact of a 4-week lifestyle intervention on obese children and their families.* Poster presented at the International Society for Behavioural Nutrition and Physical Activity Annual Meeting, Lisbon, Portugal.

12. **Pearson, E.**, Hall, C., & Rodgers, W. (2009, June). *The influence of the scale: Examining exercise motivation in a group of non-exercising, overweight women.* Poster presented at the International Society for Behavioural Nutrition and Physical Activity Annual Meeting, Lisbon, Portugal.

13. **Pearson, E.**, Hall, C., & Gammage, K. (2009, June). *Self-presentation in exercise: A 12-week cardiovascular program for overweight female initiates*. Lecture presented at the North American Society for the Psychology of Sport and Physical Activity Conference, Austin, Texas.

14. Gray, C., McGowan, E., **Pearson, E.**, Hall, C., Prapavessis, H., Shapcott, K. et al. (2009, June). *Do behavioural regulations drive physical activity behaviour in "action" stage exercisers?* Poster presented at the North American Society for the Psychology of Sport and Physical Activity Conference, Austin, Texas.

15. **Pearson, E.**, Hall, C. (2008, November). *The impact of body composition feedback on adherence in an 18-week exercise program for women*. Poster presented at the Canadian Society for Psychomotor Learning and Sport Psychology Conference, Canmore, Alberta.

16. **Pearson, E.**, Hall, C. (2008, March). *Investigating the impact of an 18-week cardiovascular exercise program on body composition in female non-exercisers.* Poster presented at the U.W.O. Faculty of Health Sciences Research Forum, London, Ontario.

17. McGowan, E., **Pearson, E.**, Hall, C., Prapavessis, H., Shapcott, K., Newnham-Kanas, C. et al. (2008, June). *Examining needs satisfaction in "action" stage exercisers*. Poster presented at the North American Society for the Psychology of Sport and Physical Activity Conference, Niagara Falls, Ontario.

TEACHING

Undergraduate

Health Sciences 3290B: Special Topics in Health Promotion
Course Instructor (3 hours per week plus office hours)

Course description: The purpose of this course is to provide students with an understanding of the approaches, theories, and evidence surrounding contemporary issues in health promotion. A critical lens will be employed to examine the relationships between lifestyle behaviours and health from both individual and societal perspectives through applying the principles of lifestyle psychology.
Responsibilities: Responsible for all aspects of course development, preparation, delivery, and assessment

Health Sciences 4800G: Methods in Evidence-Based Practice
Course Instructor (3 teaching hours per week plus office hours)

Course description: This essay course focuses on the application of previously learned statistical and methodological information in the systematic evaluation of published research in health sciences. Topics covered include the systematic appraisal of quantitative and qualitative research articles, the critical appraisal of best practice guidelines, and an introduction to the art of scientific writing.
Responsibilities: Responsible for the preparation and delivery of lectures pertaining to course materials, marking of assignments and essays

Health Sciences 1001A and 1002B: Personal and Social Determinants of Health
Hired as Course Instructor through U.W.O. for Six Nations Polytechnic Institute
Courses cancelled in September 2010 due to low enrollment

Course description: The purpose of these courses is to introduce students to the constructs of health and wellness from both personal and societal perspectives. The courses cover a range of health-related topics and emphasize both: (a) personal health and wellness, with a particular emphasis on increasing knowledge, awareness, and improving individual health; and (b) population health, with an emphasis on social determinants of health and health disparities among Canadians.

Health Science 1001 (formerly HS 1000): Introduction to Health and Wellness
Class size: 500
Three Graduate Teaching Assistant Appointments

Course Description: This course examines the non-medical determinants of health including the social, political, environmental, and cultural conditions, forces, and factors that influence how health is distributed amongst entire groups and populations. This course presents the social determinants of health in Canadian and comparative contexts.
Responsibilities: Responsible for developing multiple choice exam questions and marking short answer responses. In order to provide students with the opportunity for

enhanced understanding of reading material and class content, I worked to ensure availability via e-mail and office hours.

Invited Guest Lectures
Responsibilities included preparation and delivery for all guest lectures

2012 *CHANGE-ing Obesity: Using Motivational Interviewing via Co-Active Life Coaching Tools for Health Behaviour Change*
UWO Exercise and Health Psychology Lab Journal Club
Class size: 9 graduate students and faculty members

2011 *Motivation, Health Behaviour Change, and Self-Determination Theory*
Health Sciences 4091A - Health Behaviour Theories, November 14
Class size: 75 students

2011 *Health and Human Behaviour – Parents' perspectives of the Children's Health and Activity Modification Program: A lifestyle intervention for children with obesity and their families*
Health Sciences 1000 – Introduction to Health and Wellness, June 6
Class Size: 50 students

2010 *Health and Human Behaviour - The C.H.A.M.P. Program*
Health Sciences 1000 – Introduction to Health and Wellness, June 1
Class Size: 50 students

2009 *Weight Management and the C.H.A.M.P. Program*
Health Sciences 1000 – Introduction to Health and Wellness, November 3
Class Size: 500 students

Life Coaching Tools for Parents
Parent session for the C.H.A.M.P. Program, August 29
Group Size: 30 parents

Family Goal Setting and Coaching Skills
Parent session for the C.H.A.M.P. Program, August 15
Group Size: 18 parents

Extending Self-Friendship – Learning to Respect Ourselves
C.H.A.M.P. camp life coaching session, August 11
Group Size: 25 children

The Fabulous Me – Self-esteem building for children with obesity
C.H.A.M.P. camp life coaching session, August 5
Group size: 25 children

Introduction to the C.H.A.M.P. Program

C.H.A.M.P. Meet and Greet, July 29
Group Size: 60 children, families, and interdisciplinary health professionals

S.M.A.R.T. Family Goal Setting for Spring and Summer
C.H.A.M.P. Booster Session, May 30
Group Size: 5 parents

The Children's Health and Activity Modification Program: A Lifestyle Intervention for Children at risk for Type II Diabetes
London Health Sciences Centre Pharmacy Conference, April 25
Group Size: 200 health care professionals

Aging – A Vital Process: Psychological and Mental Changes
Health Sciences 1000 – Introduction to Health and Wellness, March 19
Class Size: 500 students

Life's Transitions – The Aging Process
First Nations Polytechnic, Brantford (affiliated with U.W.O.)
Health Sciences 1000 – Introduction to Health and Wellness, March 4
Class Size: 5 students

2008 *Extending Self-Friendship – A Coaching Activity for Children*
C.H.A.M.P. camp coaching session, August 19
Group Size: 15 children

Morbidity and Mortality Risk Associated with an Overweight BMI in Older Adults
The 3rd Canadian Obesity Network Summer Boot Camp, Laval Quebec. July 28
Group Size: 30 graduate students and faculty from various Canadian universities

PROFESSIONAL ASSOCIATION MEMBERSHIP

1. Canadian Obesity Network (CON)
2. North American Society for the Psychology of Sport and Physical Activity (NASPSPA)
3. International Society for Behavioural Nutrition and Physical Activity (ISBNPA)
4. Canadian Society for Psychomotor Learning and Sports Psychology (SCAPPS)